

Hercules Aerospace Company
Bacchus Works

Attn: Ms. Vera Moritz
(8HWM-FF)
Groundwater Quality Assessment
November 15, 1988


424437 - R8 SDMS

402927

424437

Volume 2

APPENDIX A

COMPLETION AND LITHOLOGIC LOGS
FOR MONITORING WELLS

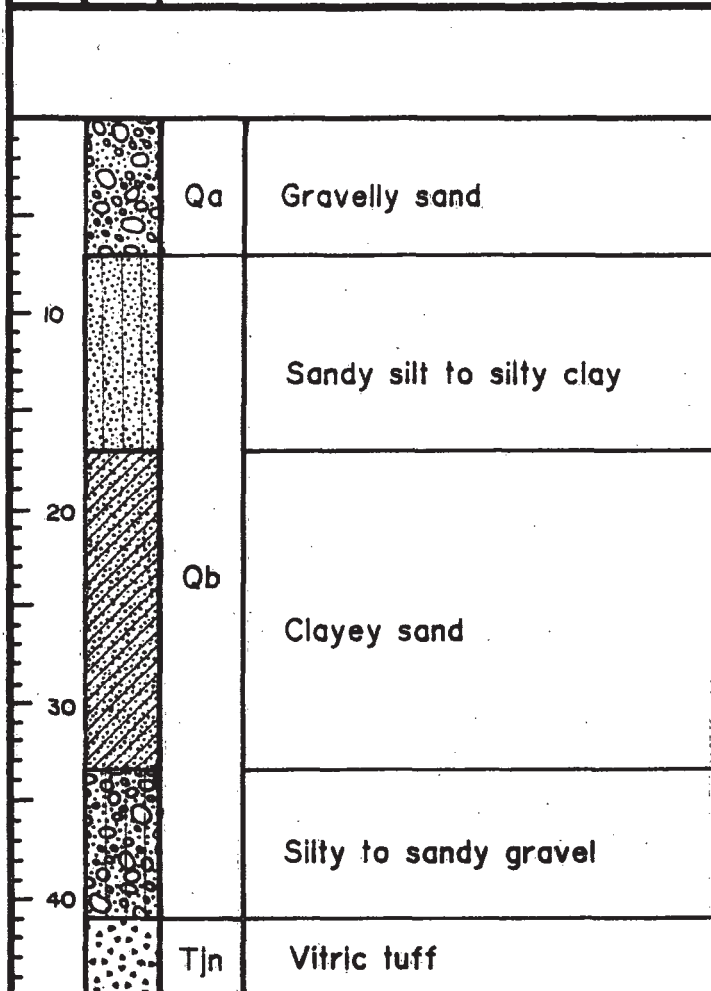
GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

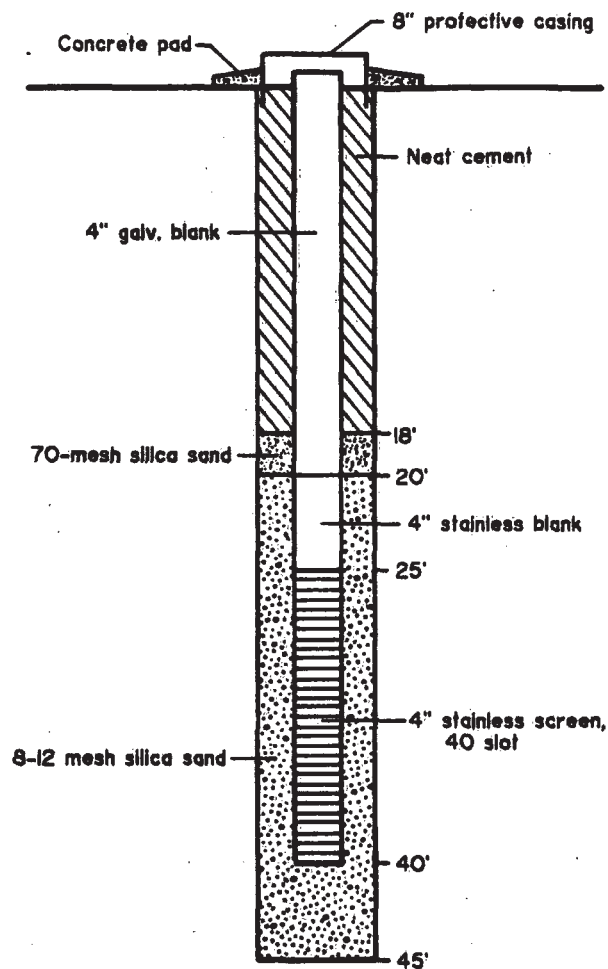
DEPTH (M)

GRAPHIC LOG

DESCRIPTION



TD=45'



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**BACCHUS
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WELL GW-1

TOP OF CASING ELEV. = 4,671.18
GROUND SURFACE ELEV. = 4,668.48

STRATIGRAPHIC LOG

GW-1

- 0'-7': Gravelly sand to sandy gravel. 85% sand, 15% gravel. Gravel is quartzite. Sand is medium to coarse grained, angular. Brown (10YR 5/3).
- 7'-17': Sandy silt to silty clay. Sand and small gravel is angular to subrounded. Gravel ranges from 1/8" to 3/4", quartzite. Gravel comprises 15% of sample volume, may be from above. Increasing clay and sand with depth. Moderate dilatancy, high plasticity. Brown (10YR 5/3).
- 17'-33.5': Clayey sand. Gravel content increases with depth, grading to sandy gravel. Sand is medium to coarse grained. Gravel averages 1/4", subrounded, quartzite. At depth, gravel increases to 2". Brown (10YR 4/3).
- 33.5'-41': Silty to sandy gravel. 50% gravel, 40% sand, 10% silt with minor clay lenses. Gravel is quartzite. Sand is fine to coarse grained. Pale brown (10YR 6/3).
- 41'-45': Vitric tuff. Very fine grained, moderately devitrified, clay is bentonitic. Light gray (10YR 7/1).

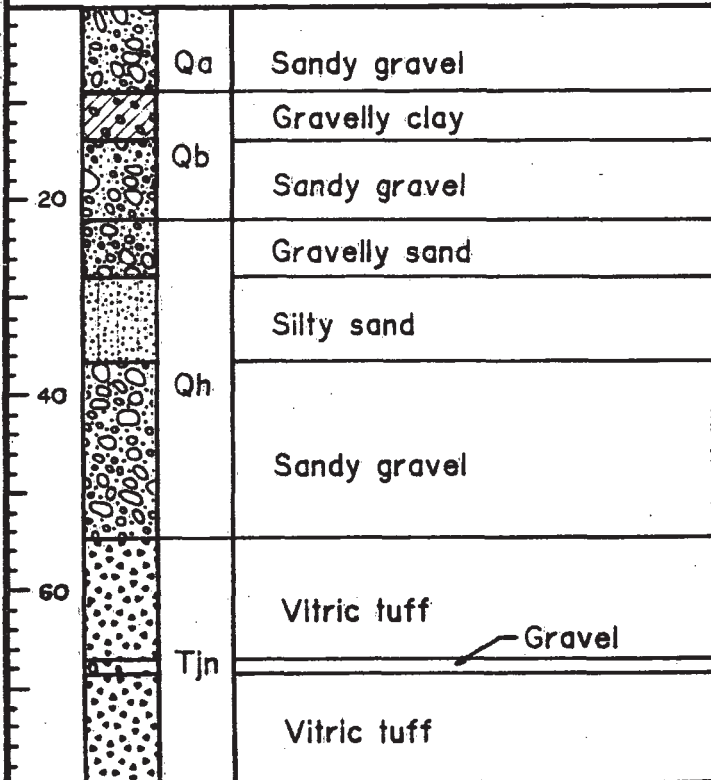
GEOLOGIC LOG

DEPTH (ft)

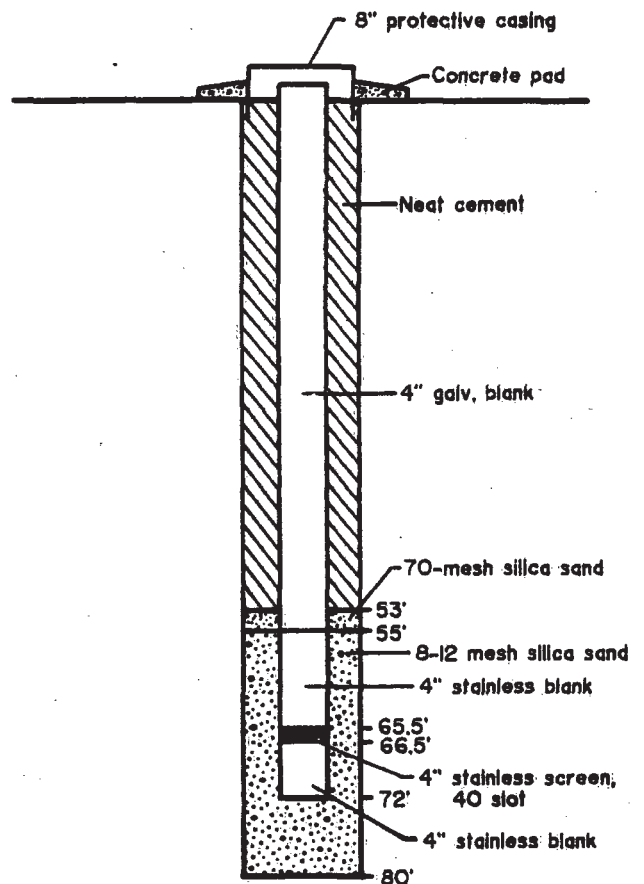
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=80'



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WELL GW-2

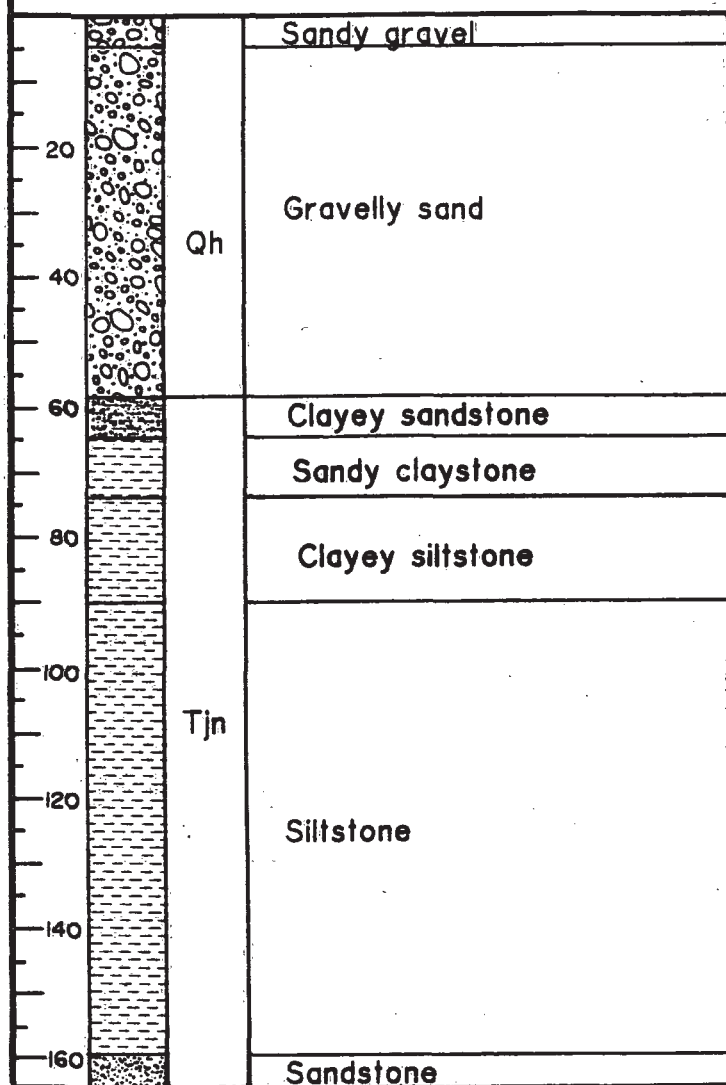
TOP OF CASING ELEV. = 4,718.87
GROUND SURFACE ELEV. = 4,716.15

STRATIGRAPHIC LOG

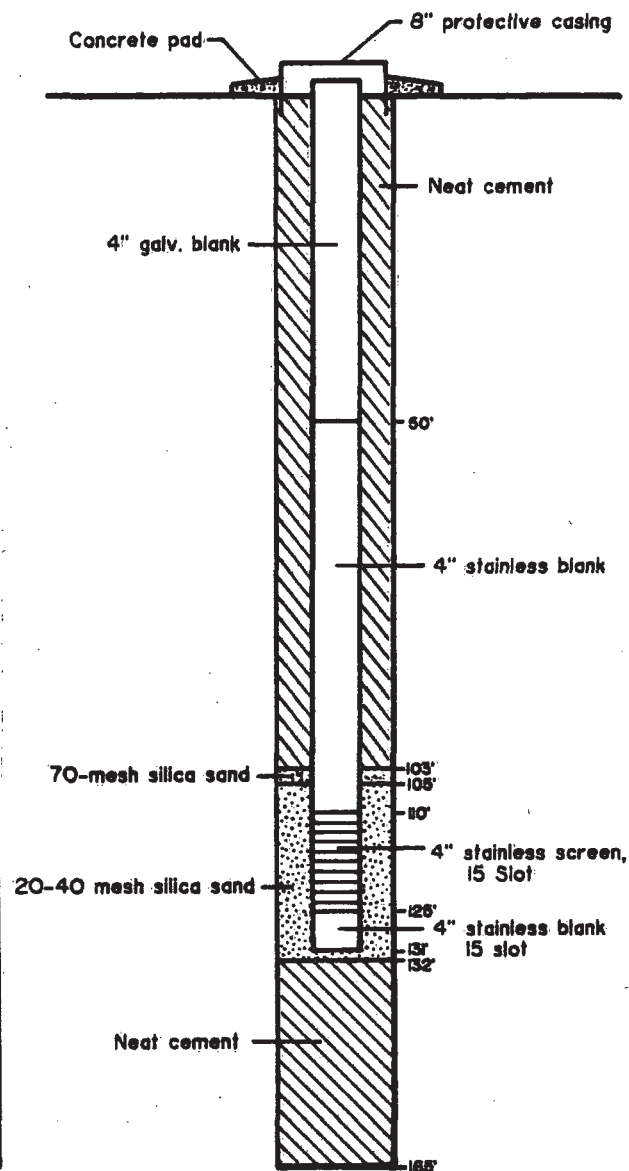
GW-2

- 0'-9': Sandy gravel. 60% gravel, 20% sand, 20% silt. Gravel averages 1/4", subrounded to sub-angular, quartzite. Sand is medium to coarse grained. Brown (10YR 5/3).
- 9'-14': Gravelly clay. Plastic, slow dilatancy. 50% clay, 40% gravel, 10% sand. Gravel ranges from 1/4" to 1/2", subrounded to subangular, quartzite. Light brownish gray (10YR 6/2).
- 14'-22': Sandy gravel. 80% gravel, 10% sand, 10% silt. Gravel ranges from 1/4" to 1/2", subrounded. Sand is poorly sorted. Pale brown (10YR 6/3).
- 22'-28': Gravelly sand. 55% sand, 30% gravel, 15% silt and clay. Sand is very fine. Gravel is quartzite, limestone. Brown (10YR 5/3).
- 28'-37': Silty sand. 80% sand, 10% silt, 10% gravel. Sand is very fine to fine grained. Brown (10YR 5/3).
- 37'-55': Sandy gravel. Sand is medium grained. Gravel is quartzite, limestone and igneous. Pale brown (10YR 6/3).
- 55'-67.5': Vitric tuff. Very fine grained. Light gray (10YR 7/2).
- 67.5'-68.5': Gravel: quartzite, limestone, fine grained sandstone, poorly sorted.
- 68.5'-80': Vitric tuff. Moderately devitrified, clay is bentonitic. Gray (10YR 6/1).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=165'



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WELL GW-3

TOP OF CASING ELEV. = 4,808.41
GROUND SURFACE ELEV. = 4,806.53

STRATIGRAPHIC LOG

GW-3

- 0'-5': Sandy gravel. 60% gravel, 30% sand, 10% clay. Gravels range from 1/4" to 1", subangular. Sand is fine to medium grained. Brown (10YR 4/3).
- 5'-9': Gravelly sand. 50% sand, 30% gravel, 20% clay. Brown (10YR 5/3).
- 9'-59': Gravelly sand. 55% sand, 40% gravel, 5% silt and clay. Sand is medium to fine grained. Gravel is quartzite. Brown (10YR 5/3).
- 59'-65': Clayey sandstone. Pale brown (10YR 6/3).
- 65'-74': Sandy claystone. 80% clay, 10% sand, 10% gravel. Light gray (10YR 7/2).
- 74'-82': Clayey siltstone. 60% silt, 30% clay, 10% sand. Sand is medium to coarse grained. Gray (10YR 6/1).
- 82'-90': Same as above, but with a slight increase in the clay percentage. Dark gray (7.5YR 4/0).
- 90'-160': Siltstone. Slightly effervescent to highly effervescent. Moderately indurated, low permeability. Dark gray (7.5YR 4/0).
- 160'-165': Sandstone. Very fine grained. Vitric ash shards, quartz grains. Moderately indurated, moderate permeability. Olive gray (5Y 5/2).

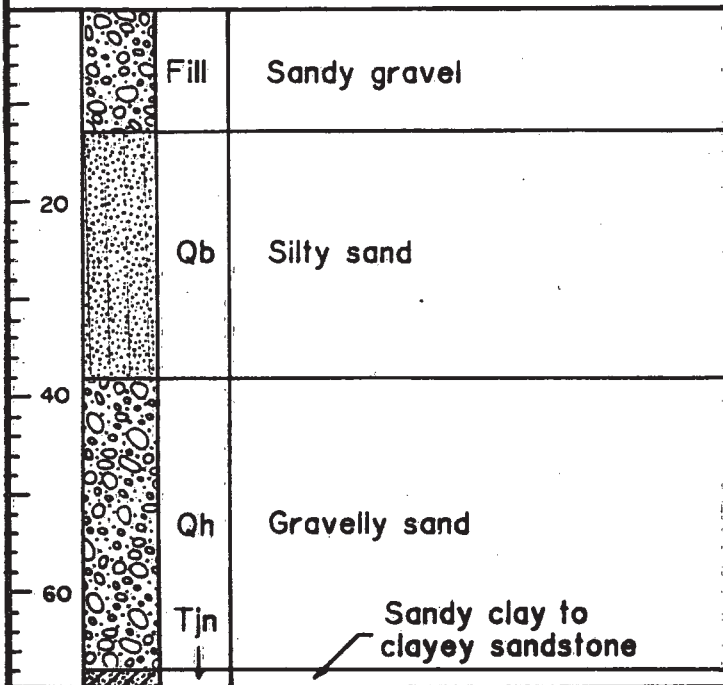
GEOLOGIC LOG

DEPTH (ft)

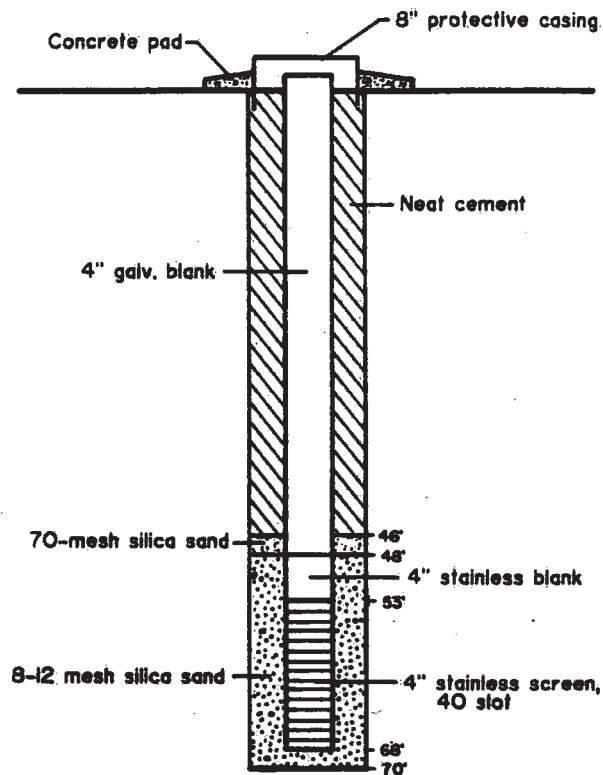
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=70°



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WELL GW-4

TOP OF CASING ELEV. = 4,704.81
GROUND SURFACE ELEV. = 4,702.04


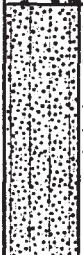
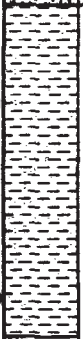

STRATIGRAPHIC LOG

GW-4

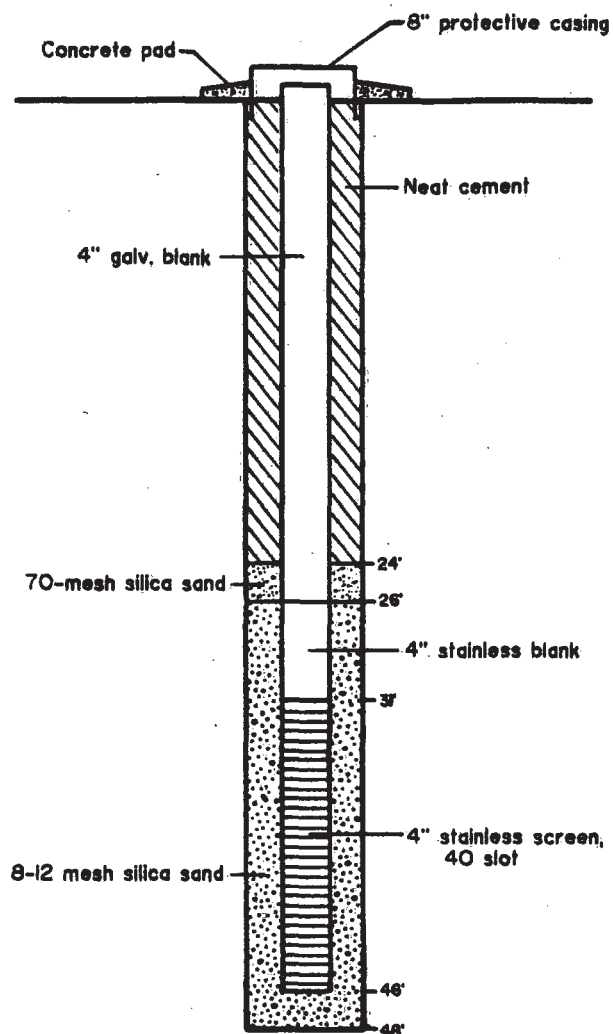
- 0'-13': Sandy gravel. 65% gravel, 25% sand, 10% fines. Calcic horizon (?) at 6'. Clay content increases with depth. Pale brown (10YR 6/3).
- 13'-38': Silty sand. 80% sand, 15% fines, 5% gravel. Sand is very fine. Brown (10YR 5/3).
- 38'-68': Gravelly sand. 60% sand, 30% gravel, 10% fines. Sand is very fine to medium grained. Gravel ranges from 1/4" to 3/8", subrounded. Yellowish brown (10YR 5/4).
- 68'-70': Sandy clay to clayey sandstone. Sand is very fine grained vitric ash shards and quartz grains. Clay is bentonitic, has moderate to slow dilatancy, medium plasticity. Light gray (2.5Y 7/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
10		Qb Gravelly silt
20		Qh Silty sand
30		Tjn Sandy siltstone
40		Clayey sandstone

TD=48'



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WELL GW-5

TOP OF CASING ELEV. = 4,675.77
GROUND SURFACE ELEV. = 4,673.75

STRATIGRAPHIC LOG

GW-5

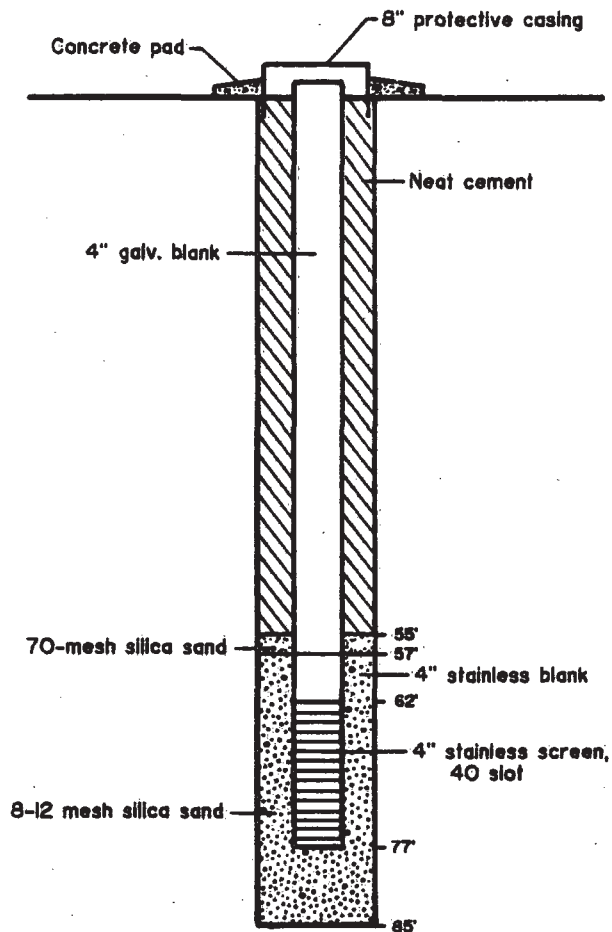
- 0'-12': Gravelly silt. 60% silt, 20% gravel, 20% clay. Very dark gray (10YR 3/1).
- 12'-25': Silty sand. 60% sand, 20% fines, 20% gravel. Sand is fine to medium grained. Gravel ranges from 1/4" to 3/8", subrounded to subangular. Brown (10YR 4/3).
- 25'-42': Sandy siltstone. Sand is vitric ash and quartz, very fine grained. Light brownish gray (2.5Y 6/2).
- 42'-48': Clayey sandstone. Sand is very fine grained vitric ash shards and quartz grains. Clay is bentonitic. Light olive gray (5Y 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Clayey sand
		Sandy gravel
		Sandy clay
20	Qb	Clayey sand
40		
60	Qh	Gravelly sand
80	Tjn	Sandy claystone

TD=85'



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WELL GW-6

TOP OF CASING ELEV. = 4,716.43
GROUND SURFACE ELEV. = 4,714.00

STRATIGRAPHIC LOG

GW-6

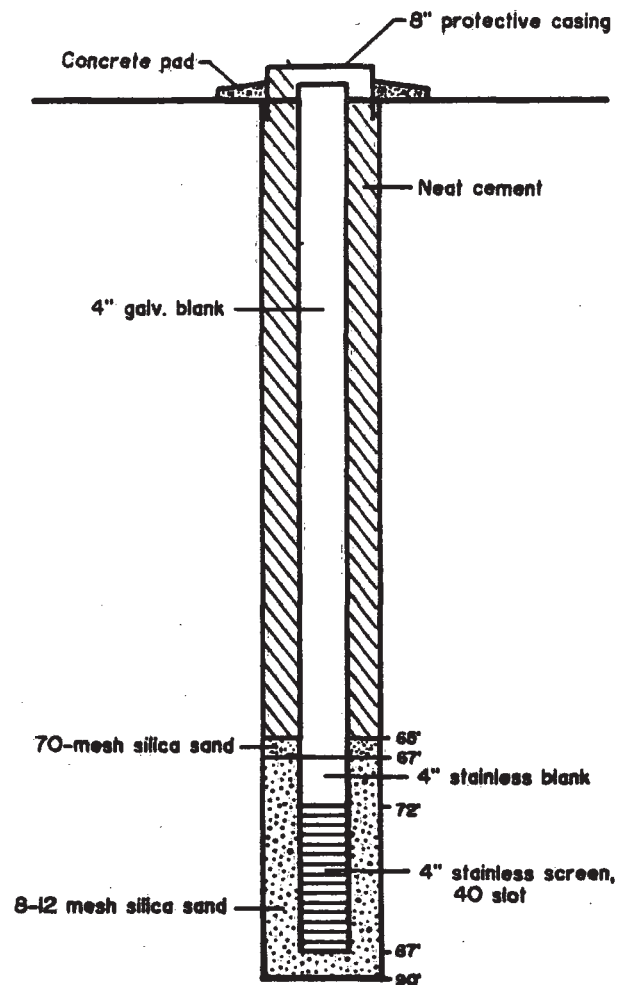
- 0'-3': Clayey sand. 50% sand, 30% clay, 20% gravel. Gravel ranges from 1/4" to 1", subrounded to subangular, quartzite. Very dark grayish brown (10YR 3/2).
- 3'-12': Sandy gravel. 50% gravel, 40% sand, 10% silt. Gravel ranges from 1/4" to 3/4", subrounded to subangular. Sand is medium to coarse grained. Brown (10YR 5/3).
- 12'-18': Sandy clay. 75% clay, 15% sand, 10% gravel. Slow dilatancy, high plasticity. Brown (10YR 5/3).
- 18'-40': Clayey sand. 90% sand, 10% clay. Sand is very fine. Brown (10YR 5/3).
- 40'-64': Gravelly sand. 65% sand, 30% gravel, 5% fines. Sand is fine to coarse grained. Gravel is quartzite, limestone and igneous. Brown (10YR 5/3).
- 64'-77': Same as the above described sample with the clay content increasing to 20% with depth. Brown (10YR 5/3).
- 77'-85': Sandy claystone. 90% clay, 10% sand. Clay is bentonitic. Sand is very fine vitric ash. Light gray (10YR 7/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Gravelly sand
		Sandy gravel to Gravelly sand
20		
40	Qb	Clayey sand
60		
80	Qh	Gravelly sand

TD=90'



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WELL-GW7

TOP OF CASING ELEV. = 4,740.17
GROUND SURFACE ELEV. = 4,737.24

STRATIGRAPHIC LOG

GW-7

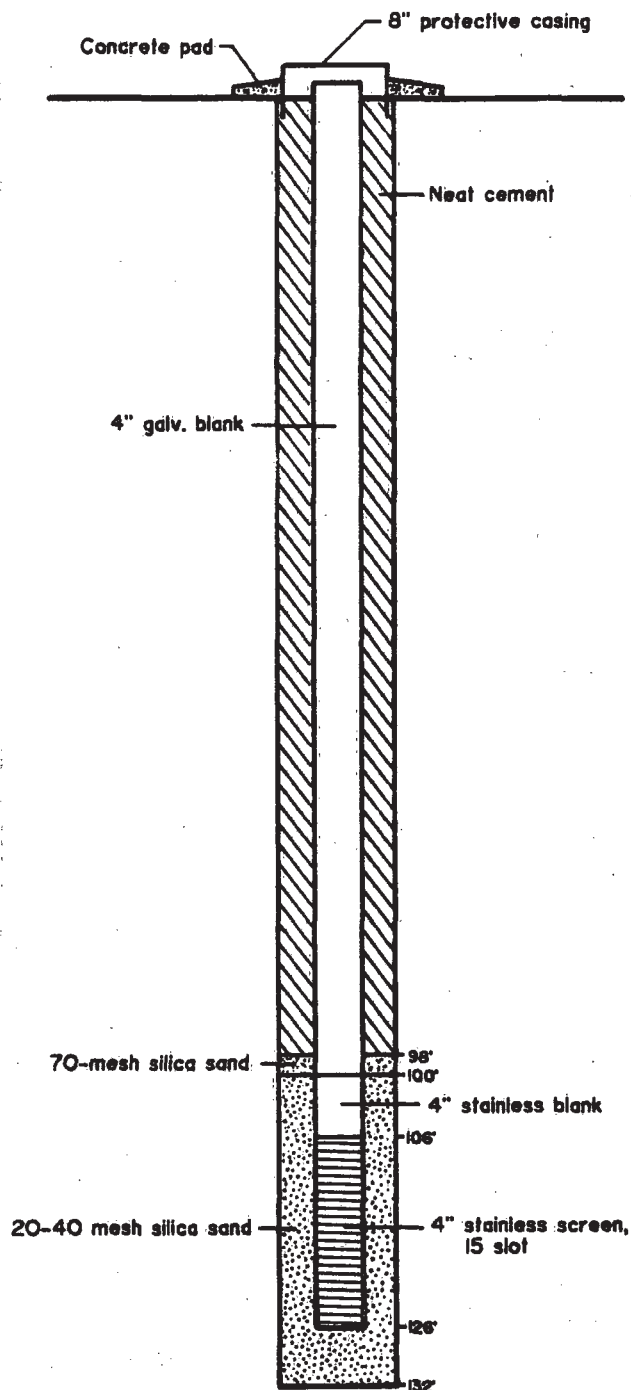
- 0'-3': Gravelly sand. 70% sand, 25% gravel, 5% fines. Sand is medium to coarse grained. Gravel ranges from 1/4" to 1". Brown (10YR 5/3).
- 3'-18': Sandy gravel to gravelly sand. 50% sand, 40% gravel, 10% fines. Sand is fine to medium grained. Gravel ranges from 1/4" to 1/2", subrounded to subangular. Brown (10YR 5/3).
- 18'-26': Clayey sand. 60% sand, 30% clay, 10% gravel. Sand is very fine grained. Gravel ranges from 1/4" to 1/2", subrounded to subangular. Yellowish brown (10YR 5/4).
- 26'-63': Clayey sand. 65% sand, 35% clay. Sand is very fine grained. Brown (10YR 4/3).
- 63'-87': Gravelly sand. 60% sand, 20% gravel, 20% fines. Sand is very fine grained. Gravel is quartzite. Brown (10YR 5/3).
- 87'-90': Gravelly sand. 50% sand, 30% gravel, 20% fines. Sand is fine to coarse grained. Gravel is quartzite, limestone, a few chert clasts. Yellowish brown (10YR 5/4).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Silt
		Gravelly sand
20		Sandy gravel
40	Qb	Silty clay
80		Claystone
100	Tjn	Sandy siltstone
120		Vitric tuff

TD=132'



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WELL GW-8

TOP OF CASING ELEV. = 4,885.67
GROUND SURFACE ELEV. = 4,882.67

STRATIGRAPHIC LOG

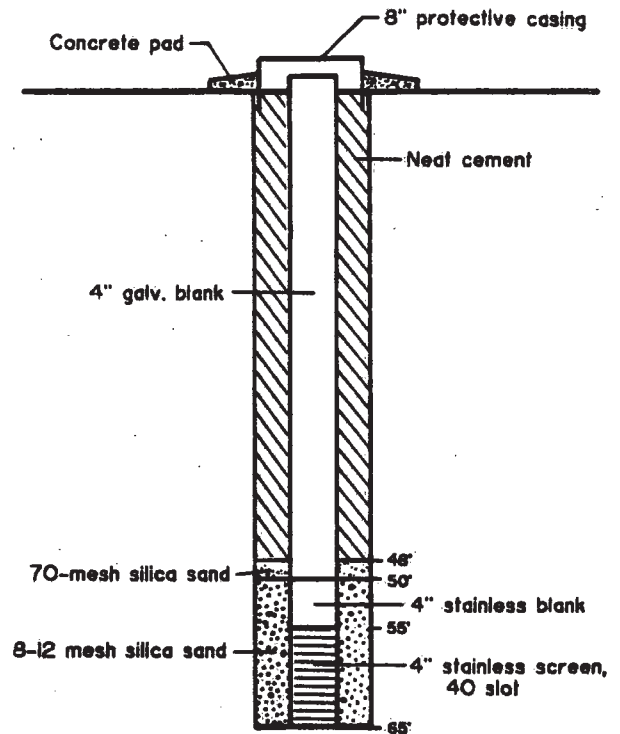
GW-8

- 0'-6': Silt. Brown (10YR 5/3).
- 6'-13': Gravelly sand. 60% sand, 35% gravel, 5% silt. Sand is very fine to medium grained. Gravel ranges from 1/4" to 3/8", subangular to subrounded, quartzite, limestone. Light yellowish brown (2.5Y 6/4).
- 13'-29': Sandy gravel. 80% gravel, 15% sand, 5% silt. Gravel ranges from 1/4" to 2", subrounded, quartzite, limestone. Sand is very fine to medium grained. Pale brown (10YR 6/3).
- 29'-50': Silty clay. 50% clay, 40% silt, 10% sand. Sand is very fine to coarse. Yellowish brown (10YR 5/4).
- 50'-65': Silty clay. 45% clay, 40% silt, 10% sand. Clay is bentonitic. Sand is vitric ash, very fine to fine grained. Light brownish gray (2.5Y 6/2).
- 65'-95': Claystone. 95% clay, 5% silt. Clay probably derived through alteration of volcanic ash. Light olive gray (5Y 6/2).
- 95'-120': Sandy siltstone. 75% silt, 25% sand. Silt is vitric ash, sand is quartz and vitric ash, very fine grained. Light olive gray (5Y 6/2).
- 120'-125': Vitric tuff. Very fine grained, white (10YR 8/1).
- 125'-132': Vitric tuff. Devitrified, clay is bentonitic. White (10YR 8/1).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		
40		
60		



TD=65'



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WELL GW-9

TOP OF CASING ELEV. = 4,736.10
GROUND SURFACE ELEV. = 4,734.05

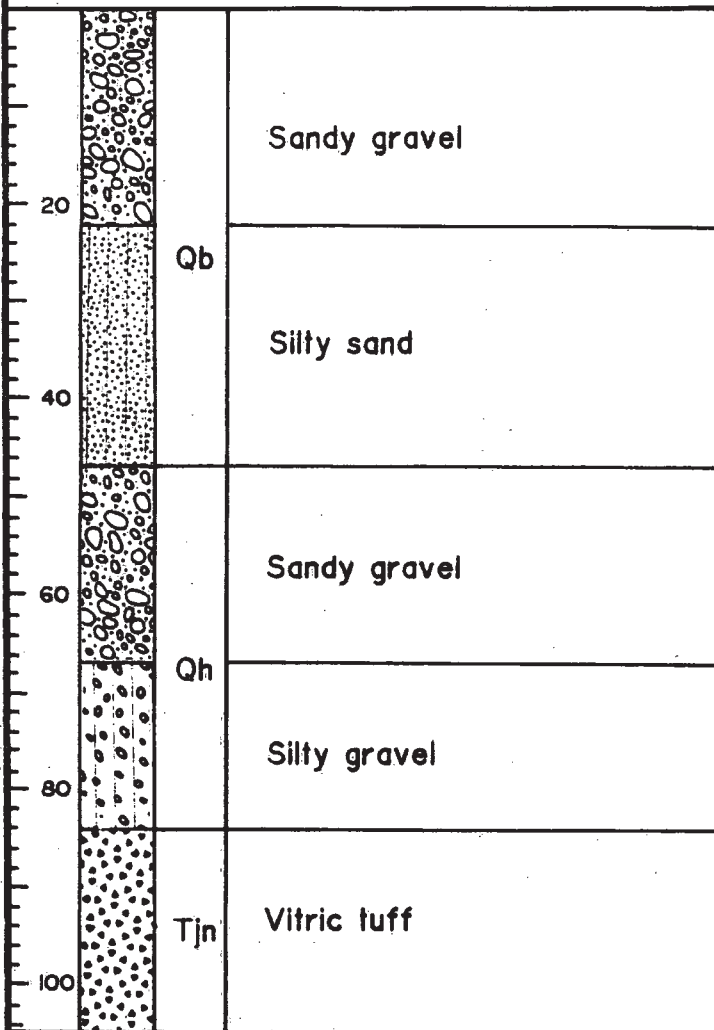
STRATIGRAPHIC LOG

GW-9

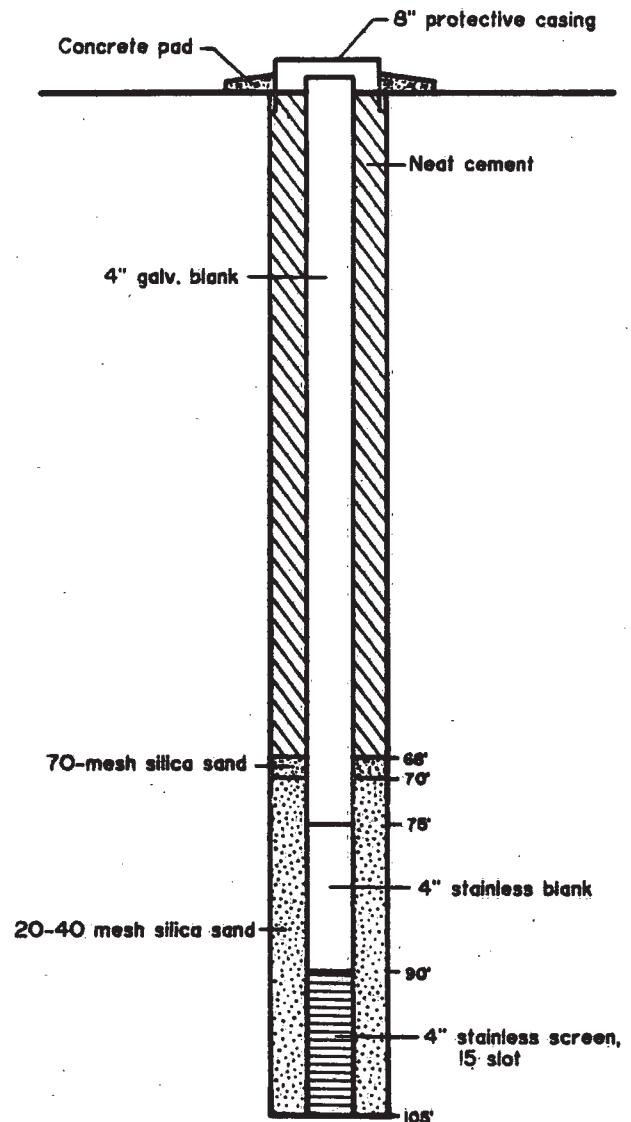
- 0'-7': Sandy silt. 60% silt, 35% sand, 5% gravel. Sand is very fine to fine grained. Very dark grayish brown (10YR 3/2).
- 7'-19': Silty gravel. 70% gravel, 20% silt, 10% sand. Gravel ranges from 1/4" to 1/2", angular to subrounded, quartzite. Sand is very fine to fine grained. Brown (10YR 5/3).
- 19'-27': Silty sand. 60% sand, 40% silt. Sand is very fine grained, some coarse. Brown (10YR 5/3).
- 27'-55': Sandy gravel. 60% gravel, 30% sand, 10% silt. Gravel as above. Sand is coarse to very coarse. Brown (10YR 5/3).
- 55'-65': Silty sand. 60% sand, 25% silt, 15% gravel. Gravel and sand as above. Brown (10YR 5/3).

[illegible]

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=105'



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WELL GW-10

TOP OF CASING ELEV. = 4,794.49
GROUND SURFACE ELEV. = 4,791.64




STRATIGRAPHIC LOG

GW-10

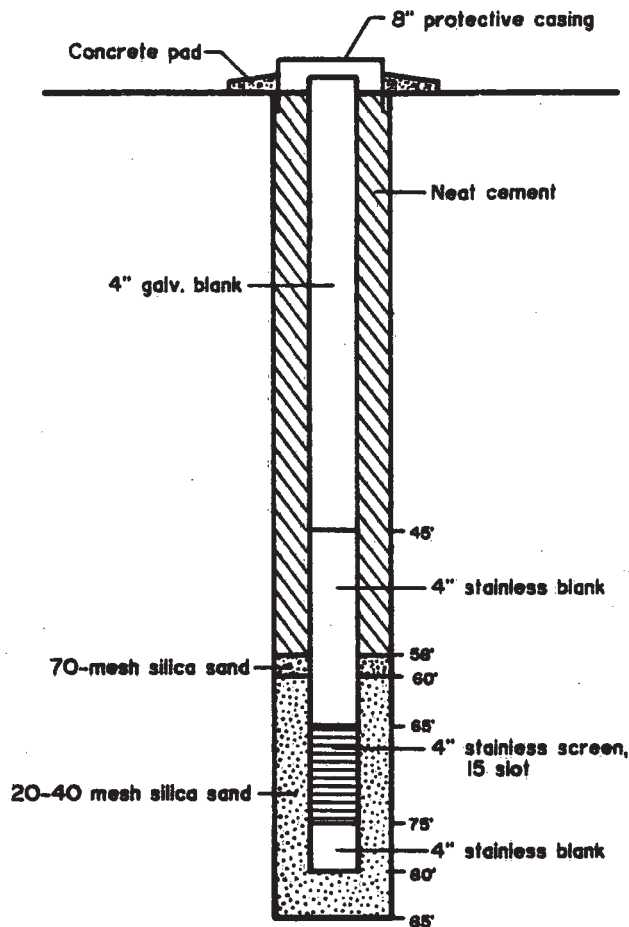
- 0'-10': Sandy gravel. 50% gravel, 40% sand, 10% fines. Gravel ranges from 1/4" to 1/2", subrounded to subangular, quartzite. Sand is coarse. Dark grayish brown (10YR 4/2).
- 10'-22': Sandy gravel. 55% gravel, 35% sand, 10% silt. Gravel ranges from 1/4" to 3/8", angular to subrounded, quartzite. Sand is medium to very coarse grained. Light yellowish brown (10YR 6/4).
- 22'-47': Silty sand. 70% sand, 25% silt, 5% fine gravel. Sand is very fine grained. Light brownish gray (2.5Y 6/2).
- 47'-67': Sandy gravel. 65% gravel, 25% sand, 10% silt. Gravel is mostly quartzite, some igneous. Sand is very fine to coarse. Light yellowish brown (2.5Y 6/4).
- 67'-84': Silty gravel. 50% gravel, 35% fines, 15% sand. Gravel as above. Sand is very fine to coarse grained. Yellowish brown (10YR 5/4).
- 84'-94': Vitric tuff. Very fine to coarse grained, quartz and vitric ash. Moderately devitrified. Light gray (2.5Y 7/2).
- 94'-105': Vitric tuff as above, but light olive gray (5Y 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		Qa Gravelly silt
20		Qb Sandy silt
40		Tjn Vitric tuff

TD=85'



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WELL GW-II

TOP OF CASING ELEV. = 4,728.74
GROUND SURFACE ELEV. = 4,726.36

STRATIGRAPHIC LOG
GW-11

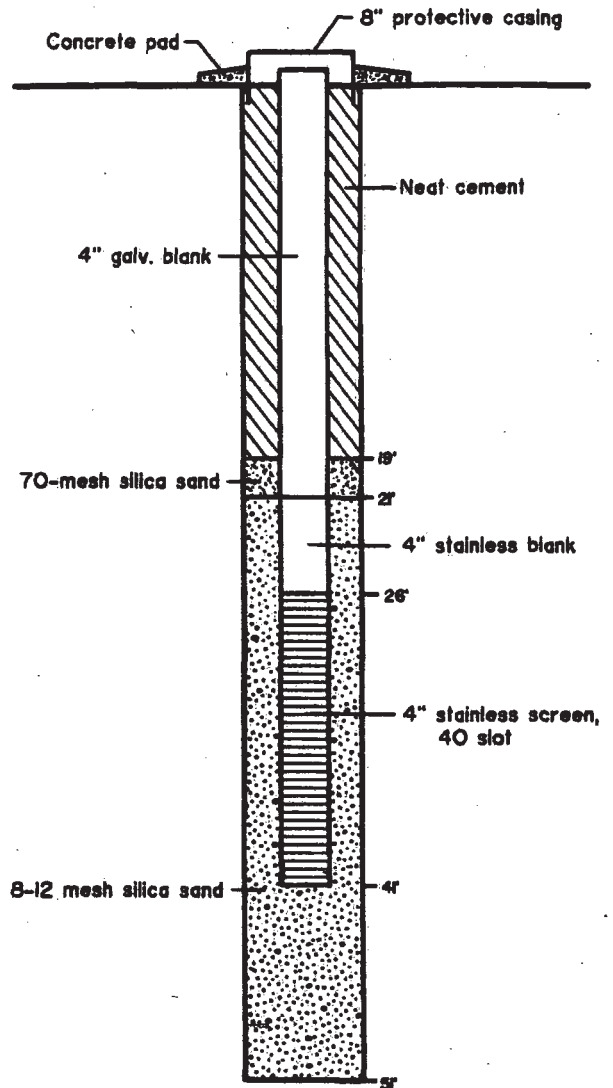
- 0'-12': Gravelly silt. 40% silt, 30% gravel, 30% sand. Sand is very fine to fine grained. Gravel ranges from 1/4" to 2", angular to subrounded, quartzite. Brown (10YR 5/3).
- 12'-36': Sandy silt. 45% silt, 30% sand, 25% gravel. Sand is fine to coarse grained. Gravel averages 1/4" subrounded to angular, quartzite and igneous. Light brownish gray (2.5Y 6/2).
- 36'-65': Vitric tuff. Moderately devitrified, clay is bentonitic. Contains some quartz grains. Light gray (5Y 7/3).
- 65'-85': Vitric tuff. Slightly devitrified. Light gray (5Y 7/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Gravelly silt
10		Sandy gravel
20		
30		Silty sand
40		
50		Sandstone

TD=51'



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WELL GW-12

TOP OF CASING ELEV. = 4,800.91
GROUND SURFACE ELEV. = 4,798.02

STRATIGRAPHIC LOG

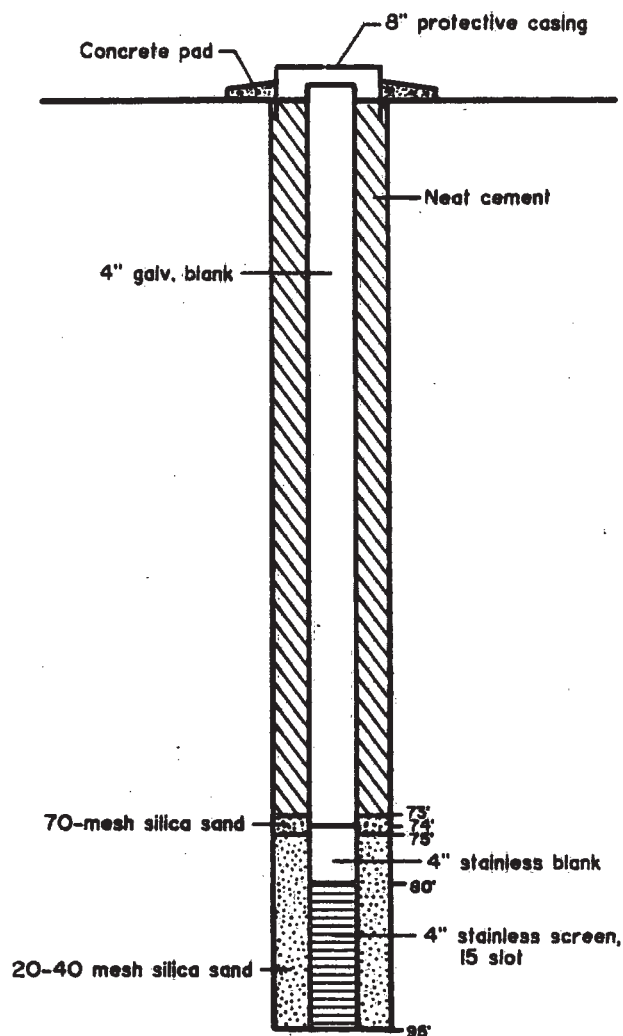
GW-12

- 0'-3': Gravelly silt. 45% silt, 30% gravel, 10% sand, 15% clay and organics. Gravels range from 1/4" to 1 3/4", subangular to subrounded. Very dark brown (10YR 2/2).
- 3'-32': Sandy gravel. 60% gravel, 30% sand, 10% silt. Gravel ranges from 1/4" to 2", subrounded to subangular. Sand is medium to fine grained, quartz and vitric ash. Light yellowish brown (10YR 6/4).
- 32'-37': Silty sand. 60% sand, 35% silt and clay, 5% gravel. Sand is fine to coarse grained vitric ash and quartz. Gravel ranges from 1/4" to 1/2", subrounded. Brown (10YR 5/3).
- 37'-51': Sandstone. Very fine to fine grained. Pale brown (10YR 6/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

0		Qa	Sandy gravel
20			Sand
		Qb	Silt
40			
60		Qh	Sandy gravel
80			
		Tjn	Voltric tuff

TD=95'



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WELL GW-13



TOP OF CASING ELEV. = 4,784.27
GROUND SURFACE ELEV. = 4,781.77

STRATIGRAPHIC LOG

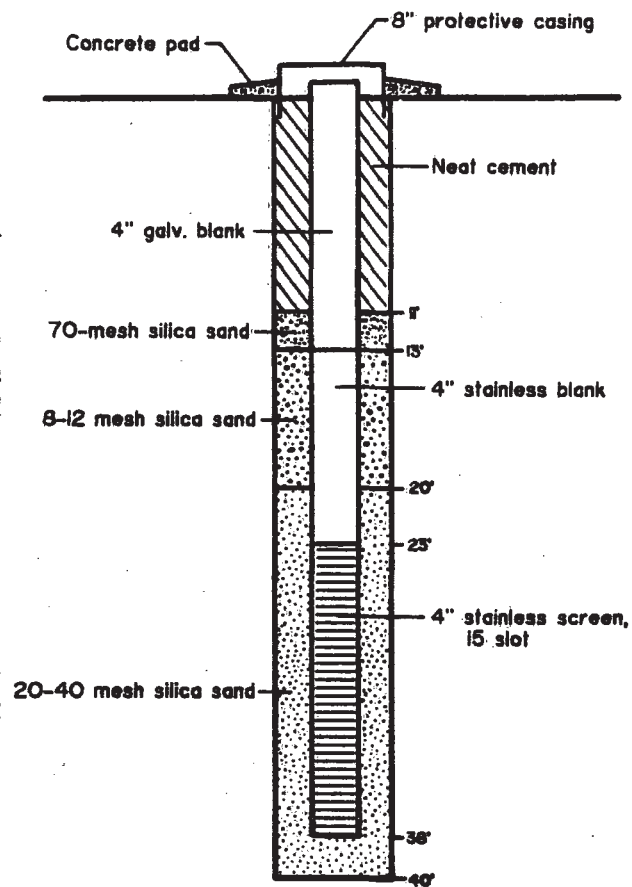
GW-13

- 0'-14': Sandy gravel. 60% gravel, 40% sand. Gravel ranges from 1/4" to 2 1/2", angular to subangular. Sand is very fine to fine. Dark grayish brown (10YR 4/2).
- 14'-25': Sand. 90% sand, 5% gravel, 5% silt. Sand is very fine to medium grained. Gravel ranges from 1/4" to 3/8", angular to subangular, quartzite and igneous. Brown (10YR 5/3).
- 25'-38': Silt. 90% silt, 10% sand. Sand is very fine to coarse. Brown (10YR 5/3).
- 38'-60': Sandy gravel. 70% gravel, 20% sand, 10% silt. Gravel is 50% quartzite, 50% igneous. Brown (10YR 5/3).
- 60'-82': Sandy gravel. 65% gravel, 25% sand, 10% silt. Gravel is quartzite. Sand is very fine to coarse grained. Brown (10YR 5/3).
- 82'-93': Vitric tuff. Very fine grained. Light gray (2.5Y 7/2).
- 93'-95': Vitric tuff as above, but devitrified.

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

		Qb	Silty sand
10		Tjn	Vitric tuff
20			
30			Vitric tuff

TD=40'



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WELL GW-14

TOP OF CASING ELEV. = 4,804.69
GROUND SURFACE ELEV. = 4,801.77

STRATIGRAPHIC LOG

GW-14

- 0'-7': Silty sand. 90% sand, 10% silt. Sand is fine to medium grained. Brown (10YR 4/3).
- 7'-28': Vitric tuff. Very fine grained vitric ash. Contains some medium grained quartz sand. Brown (10YR 5/3).
- 28'-40': Vitric tuff as above, but moderately devitrified. Pale brown (10YR 6/3).

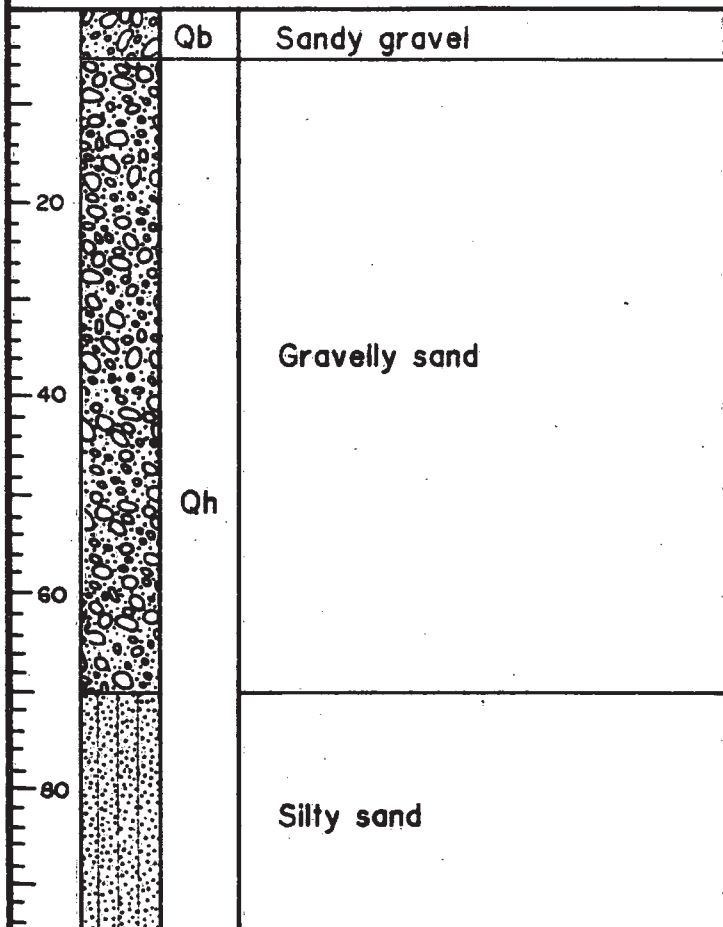
GEOLOGIC LOG

DEPTH (ft)

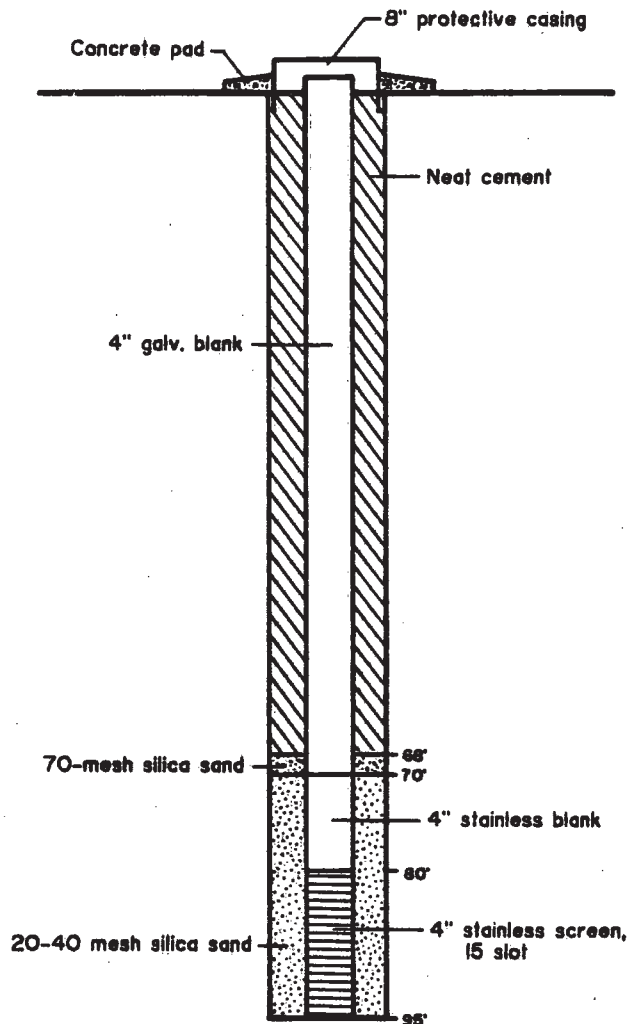
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=95'



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BACCHUS WORKS

WELL GW-15

TOP OF CASING ELEV. = 4,884.21
GROUND SURFACE ELEV. = 4,881.86

STRATIGRAPHIC LOG

GW-15

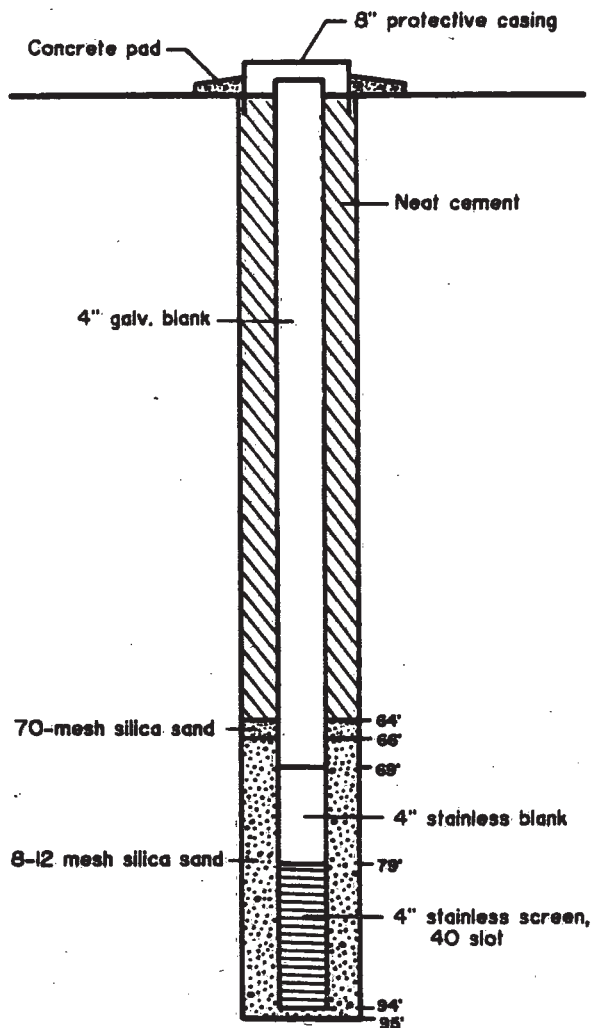
- 0'-5': Sandy gravel. 45% gravel, 45% sand, 10% silt. Gravel ranges from 1/4" to 3/8", subrounded to subangular, quartzite, limestone. Sand is medium to coarse grained. Brown (10YR 5/3).
- 5'-20': Gravelly sand. 60% sand, 25% gravel, 15% silt. Sand is very fine to very coarse. Gravel as above. Yellowish brown (10YR 5/4).
- 20'-50': Gravelly sand. 70% sand, 25% gravel, 5% silt and clay. Sand is very fine to coarse. Gravel as above. Yellowish brown (10YR 5/4).
- 50'-70': Gravelly sand. 70% sand, 15% gravel, 15% silt. Sand is from very fine to very coarse. Gravel is quartzite, limestone and igneous. Light yellowish brown (10YR 6/4).
- 70'-95': Silty sand. 60% sand, 30% silt and clay, 10% gravel. Sand is very fine to very coarse. Gravel is quartzite, limestone, and igneous. Brown (10YR 5/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		
40		
60		
80		

TD=95'



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WELL GW-16

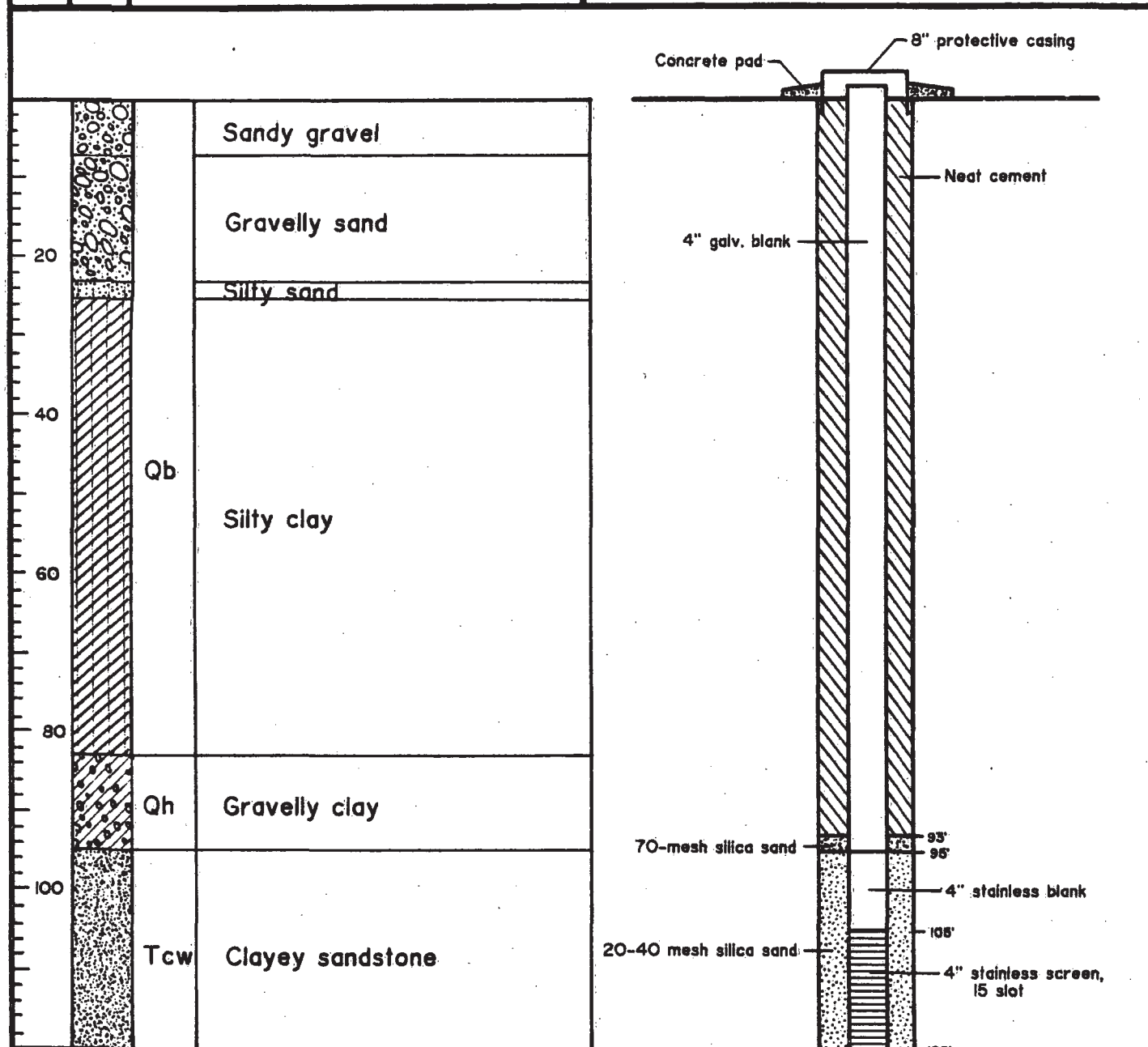
TOP OF CASING ELEV. = 4,888.47
GROUND SURFACE ELEV. = 4,885.30

STRATIGRAPHIC LOG

GW-16

- 0'-13': Sandy gravel. 65% gravel, 20% sand, 15% silt. Gravel ranges from 1/4" to 1/2", rounded to subrounded, quartzite. Sand is fine to medium grained. Brown (10YR 4/3).
- 13'-25': Sandy silt. 60% silt, 25% sand, 15% clay. Sand is very fine to fine grained. Brown (10YR 5/3).
- 25'-44': Silty clay. 70% clay, 30% silt. Slow dilatancy, high plasticity. Brown (10YR 5/3).
- 44'-49': Silty gravel. 65% gravel, 20 silt and clay, 15% sand. Gravel is quartzite. Sand is very fine to coarse grained mafics and quartz. Yellowish brown (10YR 5/4).
- 49'-65': Sandy gravel. 50% gravel, 30% sand, 20% silty clay. Gravel is quartzite. Sand is very fine to very coarse grained. Light yellowish brown (10YR 6/4).
- 65'-95': Silty sand. 60% sand, 25% silt, 15% gravel. Sand is very fine to coarse grained (mostly fine). Light yellowish brown (10YR 6/4) and brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=120'



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HERCULES

BACCHUS
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WELL GW-17

TOP OF CASING ELEV. = 4,919.37
GROUND SURFACE ELEV. = 4,916.30

STRATIGRAPHIC LOG

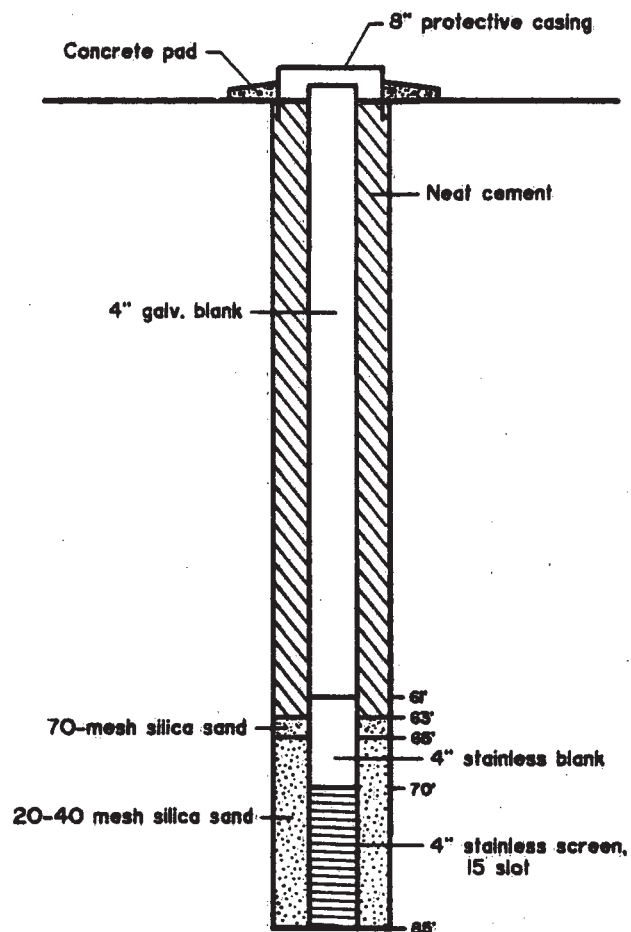
GW-17

- 0'-7': Sandy gravel. 75% gravel, 20% sand, 5% silt. Gravel ranges from 1/4" to 1/2"+, subrounded to subangular, quartzite. Sand is very fine to coarse grained. Brown (10YR 5/3).
- 7'-23': Gravelly sand. 60% sand, 30% gravel, 10% silt. Sand is very fine to coarse grained. Gravel ranges from 1/4" to 1/2", subrounded to subangular, quartzite. Yellowish brown (10YR 5/4).
- 23'-25': Silty sand. 85% sand, 10% silt, 5% gravel. Sand is medium to very coarse grained, quartzite. Brown (10YR 5/3).
- 25'-65': Silty clay. 80% clay, 15% silt, 5% sand. Sand is very fine grained. No dilatancy, high plasticity. Light yellowish brown (10YR 6/4).
- 65'-83': Silty clay. 90% clay, 10% silt. Shell fragments (?). Slow dilatancy, high plasticity. Light gray (5Y 7/2).
- 83'-95': Gravelly clay. 50% clay, 35% gravel, 10% sand, 5% silt. Sand is very fine. Slow dilatancy, medium plasticity. Light yellowish brown (10YR 6/4).
- 95'-120': Clayey sandstone. Sand is very fine to medium grained. Brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

		Qb	Gravelly sand
20		Qh	Silty sand
			Gravelly sand
40			Silty sand
60			Sandy gravel
80			Silty sand

TD=85'



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HERCULES

**BACCHUS
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WELL GW-18

TOP OF CASING ELEV. = 4,874.92
GROUND SURFACE ELEV. = 4,872.42

STRATIGRAPHIC LOG

GW-18

- 0'-10': Gravelly sand. 50% sand, 40% gravel, 10% fines. Sand is fine to coarse grained. Gravel ranges from 1/4" to 3/8", subangular to angular, quartzite and igneous. Brown (10YR 5/3).
- 10-25': Silty sand. 60% sand, 25% silt, 15% clay. Sand is very fine to medium grained. Brown (10YR 4/3).
- 25'-30': Gravelly sand. 50% sand, 35% gravel, 15% silt. Sand is fine to coarse grained. Gravel is mostly quartzite, some limestone. Yellowish brown (10YR 5/4).
- 30'-55': Silty sand. 70% sand, 30% silt. Sand is very fine grained. Brown (10YR 5/3).
- 55'-64': Sandy gravel. 60% gravel, 30% sand, 10% silt. Gravel is quartzite. Sand is fine to coarse grained. Yellowish brown (10YR 5/4).
- 64'-85': Silty sand. 60% sand, 30% fines, 10% gravel. Sand is very fine to coarse grained. Gravel is quartzite. Yellowish brown (10YR 5/4).

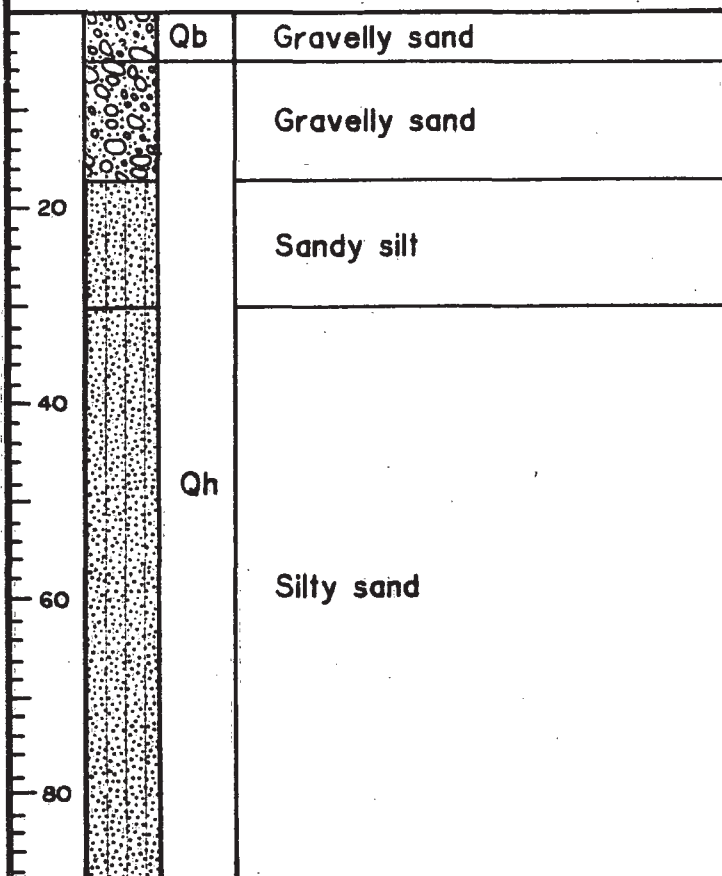
GEOLOGIC LOG

DEPTH (ft)

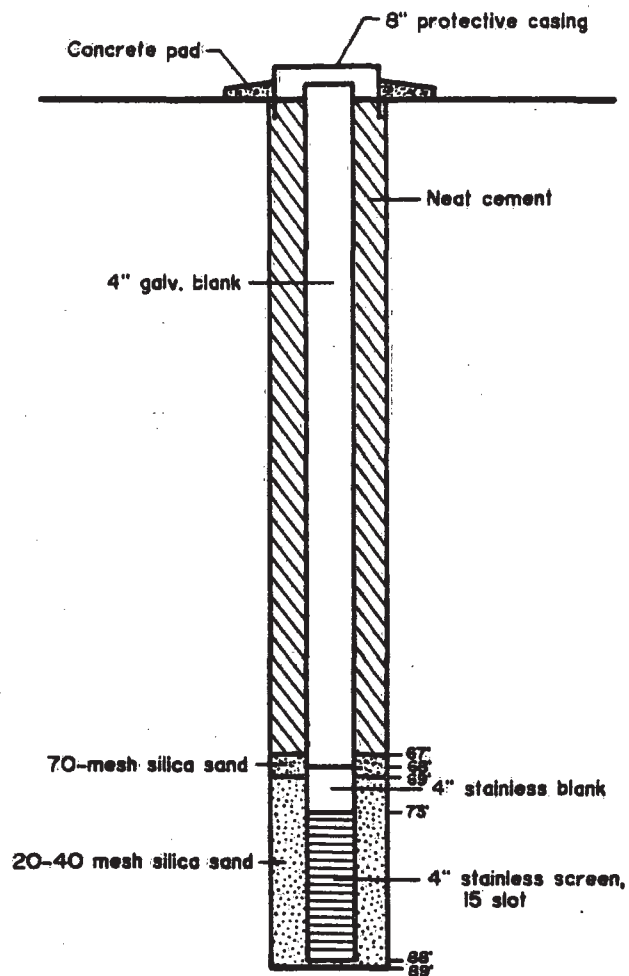
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=89'



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HERCULES

BACCHUS WORKS

WELL GW-19A

TOP OF CASING ELEV. = 4,885.61
GROUND SURFACE ELEV. = 4,883.28

STRATIGRAPHIC LOG

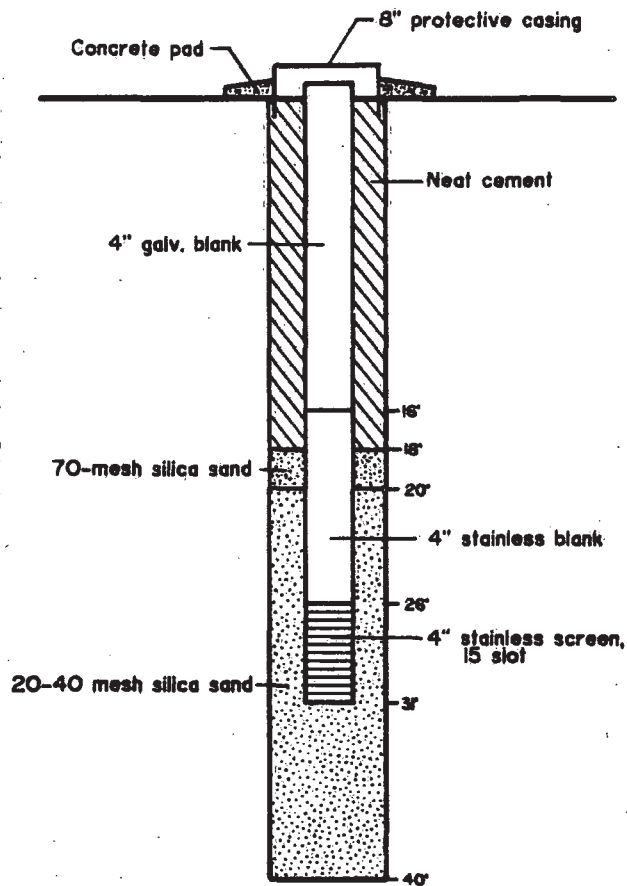
GW-19A

- 0'-5': Gravelly sand. 70% sand, 20% gravel, 10% silt. Sand is very fine to coarse grained. Gravel ranges from 1/4" to 1", angular to subangular, quartzite. Very dark grayish brown (10YR 3/2).
- 5'-17': Gravelly sand. 80% sand, 10% gravel, 10% silt. Sand is fine to coarse grained. Gravel ranges from 1/4" to 1/2", subangular to subrounded, quartzite. Brown (10YR 5/3).
- 17'-30': Sandy silt. 60% silt, 40% sand. Sand is very fine grained with <5% coarse grained. Pale brown (10YR 6/3).
- 30'-35': Silty sand. 50% sand, 30% silt, 20% gravel. Sand is very fine to coarse grained. Gravel is predominantly igneous, with some quartzite. Yellowish brown (10YR 5/4).
- 35'-89': Silty sand. 60% sand, 30% silt, 10% gravel. Sand is very fine to coarse grained (mostly coarse). Gravel is quartzite and igneous. Light yellowish brown (10YR 6/4).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		
10		Qb Silty sand
20		Tjn Silty sandstone
30		Sandy siltstone



TD=40'



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WELL GW-20

TOP OF CASING ELEV. = 4,894.25
GROUND SURFACE ELEV. = 4,892.15

STRATIGRAPHIC LOG

GW-20

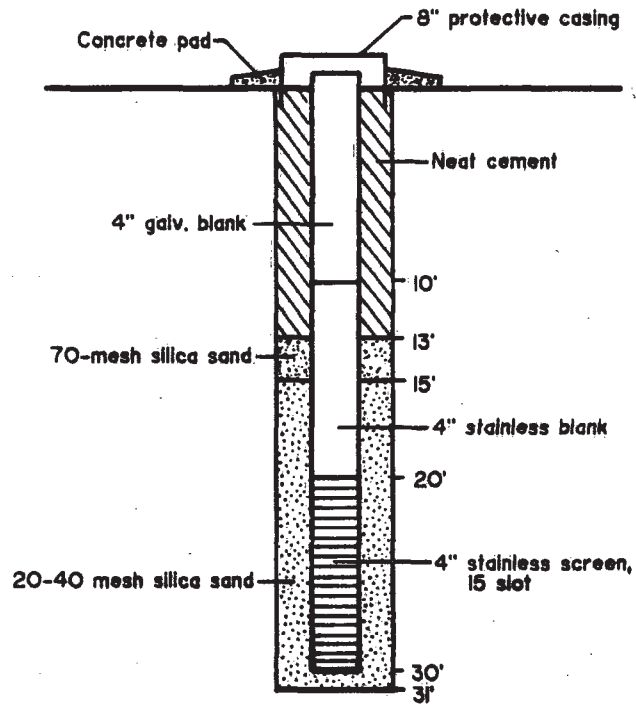
- 0'-10': Silty sand. 50% sand, 30% silt, 15% gravel, 5% clay. Sand is very fine to very coarse. Gravel ranges from 1/4" to 1/2", subangular to subrounded. Very dark gray (10YR 3/1).
- 10'-30': Silty sandstone. Very fine to medium grained. Some fines are vitric ash. Light gray (10YR 7/2).
- 30'-40': Sandy siltstone. Sand is very fine to medium grained, predominantly vitric ash, some quartz. Light brownish gray (10YR 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
	Qb	Sandy gravel
10	Tjn	Clayey siltstone
20		
30		Silty sandstone

TD=31'



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HERCULES

BACCHUS
WORKS

WELL GW-21

TOP OF CASING ELEV. = 4,893.32
GROUND SURFACE ELEV. = 4,891.07

STRATIGRAPHIC LOG

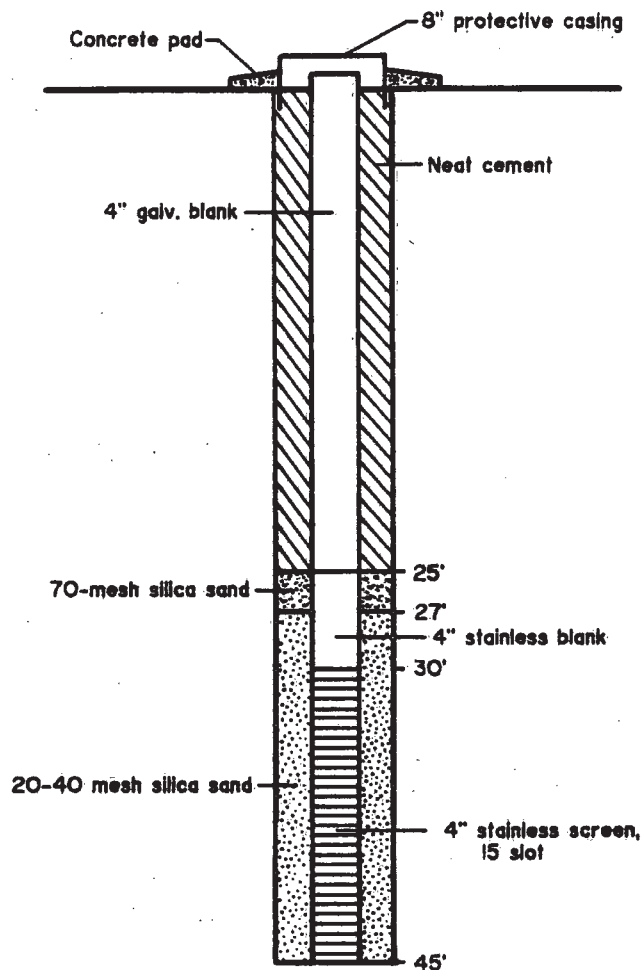
GW-21

- 0'-5': Sandy gravel. 60% gravel, 30% sand, 10% nonplastic fines. Gravel ranges from 1/4" to 3/8", subrounded to subangular, quartzite. Sand is medium to coarse grained. Grayish brown (10YR 5/2).
- 5'-25': Clayey siltstone. 70% silt, 20% clay, 10% sand. Sand is very fine grained, contains some vitric ash. Light brownish gray (2.5Y 6/2).
- 25'-32': Silty sandstone. Sand is very fine to medium grained, predominantly quartz, some vitric ash. Brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

10	Qb	Gravelly sand
20	Tjn	Vitric tuff
30		
40		

TD=45'



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HERCULES

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WELL GW-22

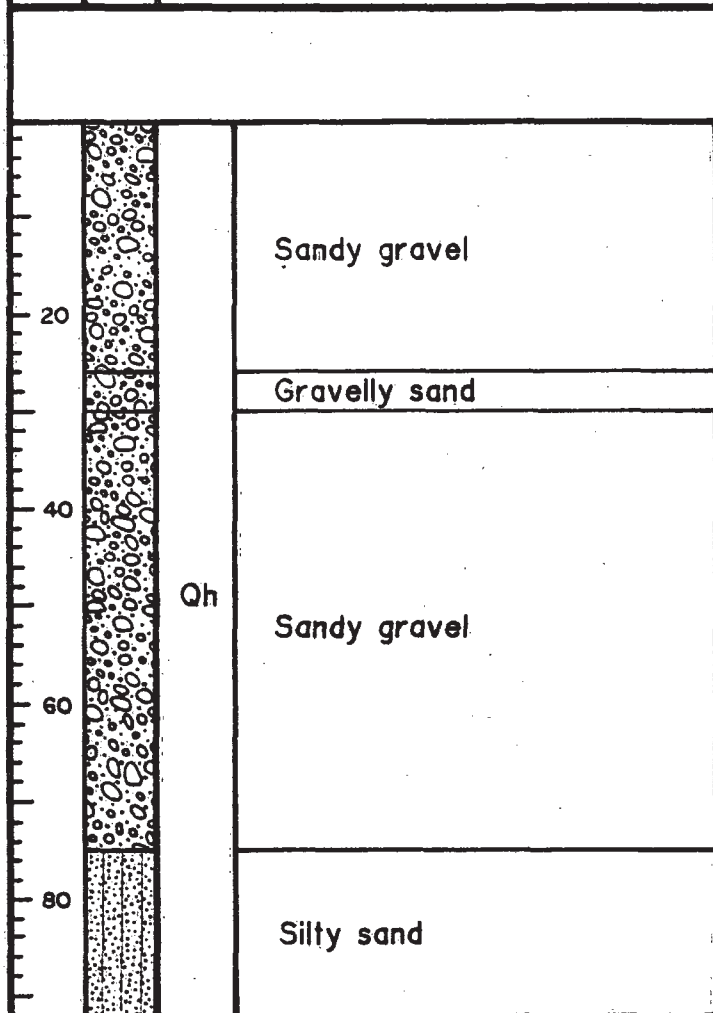
TOP OF CASING ELEV. = 4,912.21
GROUND SURFACE ELEV. = 4,910.09

STRATIGRAPHIC LOG

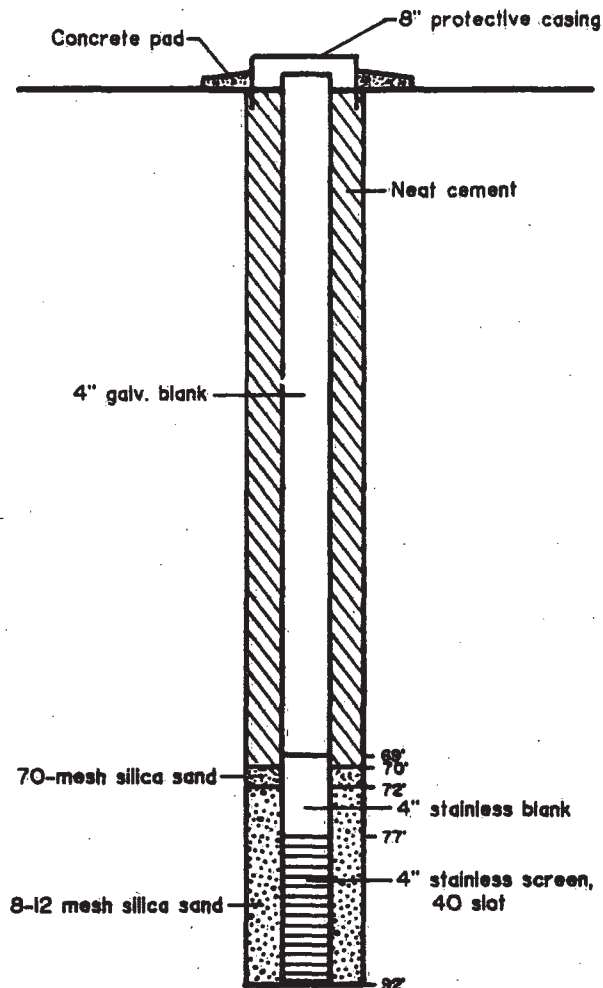
GW-22

- 0'-10': Gravelly sand. 65% sand, 25% gravel, 10% nonplastic fines. Sand is very fine to medium grained. Gravel ranges from 1/4" to 3/4", angular to subrounded. Light brownish gray (2.5Y 6/2).
- 10'-45': Vitric tuff. Very fine to fine grained. Light brownish gray (2.5Y 6/2) and light gray (5Y 7/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=92'



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HERCULES

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WELL GW-23

TOP OF CASING ELEV. = 4,905.06
GROUND SURFACE ELEV. = 4,902.76

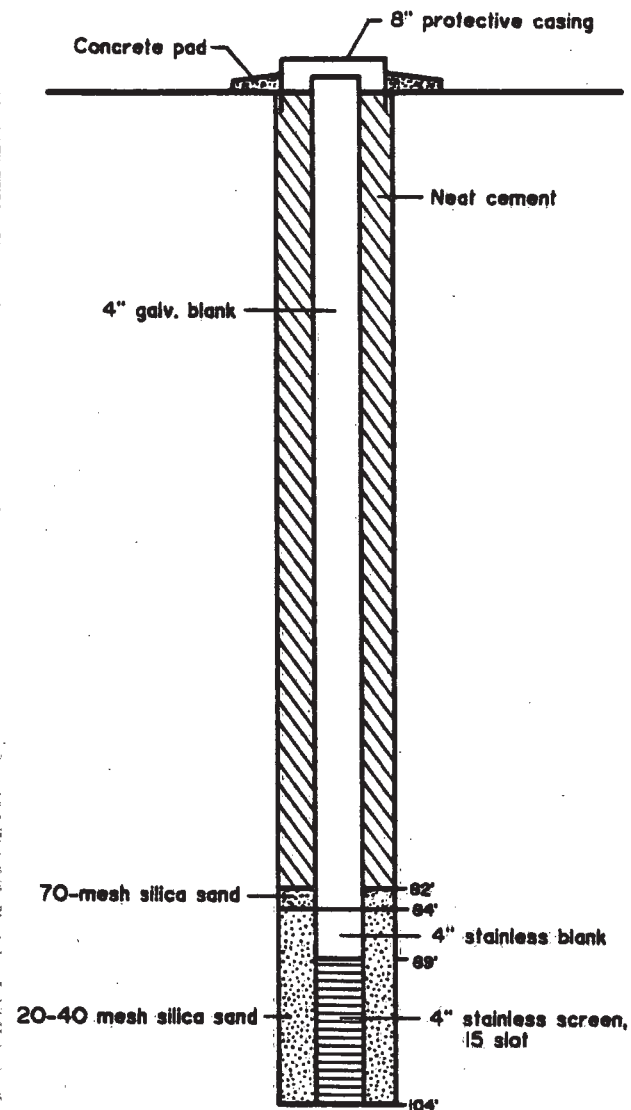
STRATIGRAPHIC LOG
GW-23

- 0'-26': Sandy gravel. 50% gravel, 30% sand, 20% silt and clay. Gravel ranges from 1/4" to 1", subrounded to angular. Sand is medium to coarse grained. Yellowish brown (10YR 5/4).
- 26'-30': Gravelly sand. 70% sand, 20% gravel, 10% silt. Sand is medium grained. Gravel ranges from 1/4" to 1/2", subrounded to angular. Brown (10YR 5/3).
- 30'-75': Sandy gravel. 50% gravel, 30% sand, 20% silt and clay. Sand is very fine to coarse. Yellowish brown (10YR 5/4).
- 75'-92': Silty sand. 65% sand, 25% silt, 5% gravel, 5% clay. Gravel is quartzite. Sand is medium to very coarse grained. Light yellowish brown (10YR 6/4).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

20	Qb	Sandy gravel
		Clayey silt
		Silty clay
40	Qh	Sandy gravel
60		
80	Tcw	Sandstone
100		

TD=104'



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HERCULES

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WELL GW-24

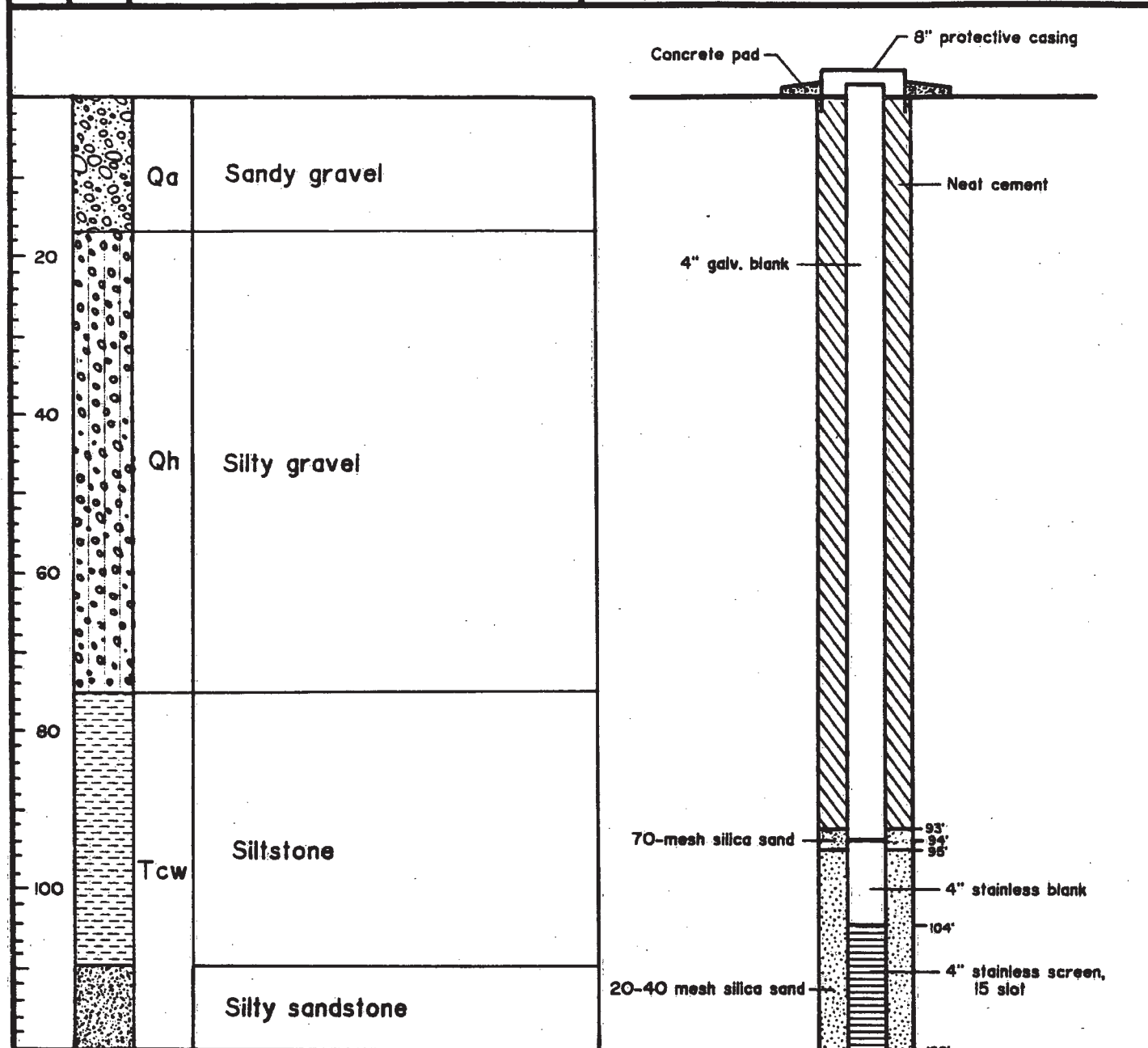
TOP OF CASING ELEV. = 4,891.97
GROUND SURFACE ELEV. = 4,889.29

STRATIGRAPHIC LOG

GW-24

- 0'-15': Sandy gravel. 65% gravel, 25% sand, 10% silt, 5% clay. Gravel ranges from 1/4" to 1",, subangular to subrounded, quartzite. Sand is medium to coarse grained. Brown (10YR 5/3).
- 15'-22': Clayey silt. 50% silt, 25% clay, 20% sand, 5% gravel. Sand is very fine. Gravel is quartzite. No dilatancy, medium plasticity. Pale red (2.5YR 6/2).
- 22'-43': Silty clay. 60% clay, 35% silt, 5% gravel. No dilatancy, medium to high plasticity. Brown (7.5YR 5/4).
- 43'-90': Sandy gravel. 55% gravel, 25% sand, 20% silt and clay. Gravel is quartzite. Sand is very fine to coarse grained. Several gradational contacts are present between clay and gravel in this sample interval. Pale brown (10YR 6/3).
- 90'-104': Gravelly sandstone. Very fine to coarse grained. 10% gravel is 50% quartzite, 50% igneous. Brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=120'



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HERCULES

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WELL GW-25

TOP OF CASING ELEV. = 4,892.32
GROUND SURFACE ELEV. = 4,890.05

STRATIGRAPHIC LOG
GW-25

- 0'-17': Sandy gravel. 50% gravel, 35% sand, 15% silt and clay. Gravel ranges from 1/4" to 1", angular to subangular. Sand is medium to coarse grained. Brown (7.5YR 5/2).
- 17'-75': Silty gravel. 60% gravel, 25% silt, 10% clay, 5% sand. Gravel ranges from 1/4" to 1/2", subangular. Brown (10YR 5/3).
- 75'-93': Sandy siltstone. 15% very fine grained quartz sand. Yellowish brown (10YR 5/4).
- 93'-110': Gravelly siltstone. 15% gravel is quartzite and igneous. Pale brown (10YR 6/3).
- 110'-120': Silty sandstone. Very fine to coarse. Light yellowish brown (10YR 6/4).

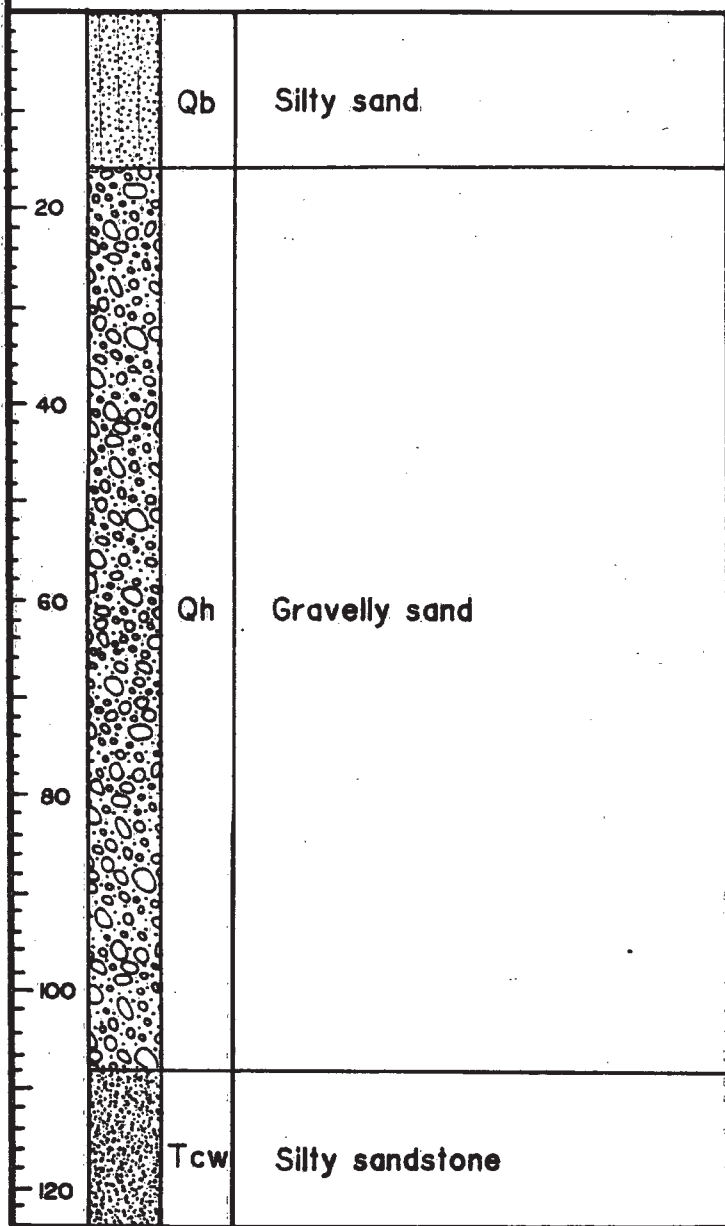
GEOLOGIC LOG

DEPTH (ft)

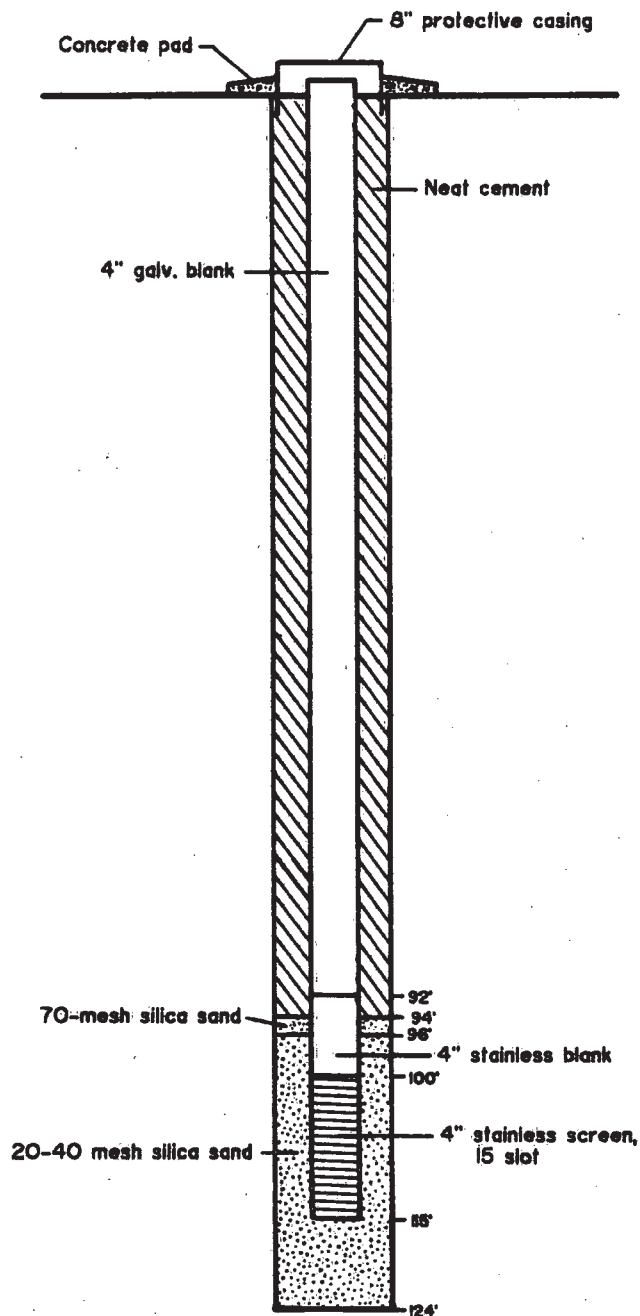
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=124'



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HERCULES

BACCHUS WORKS

WELL GW-26

TOP OF CASING ELEV. = 4,820.77
GROUND SURFACE ELEV. = 4,818.23

STRATIGRAPHIC LOG

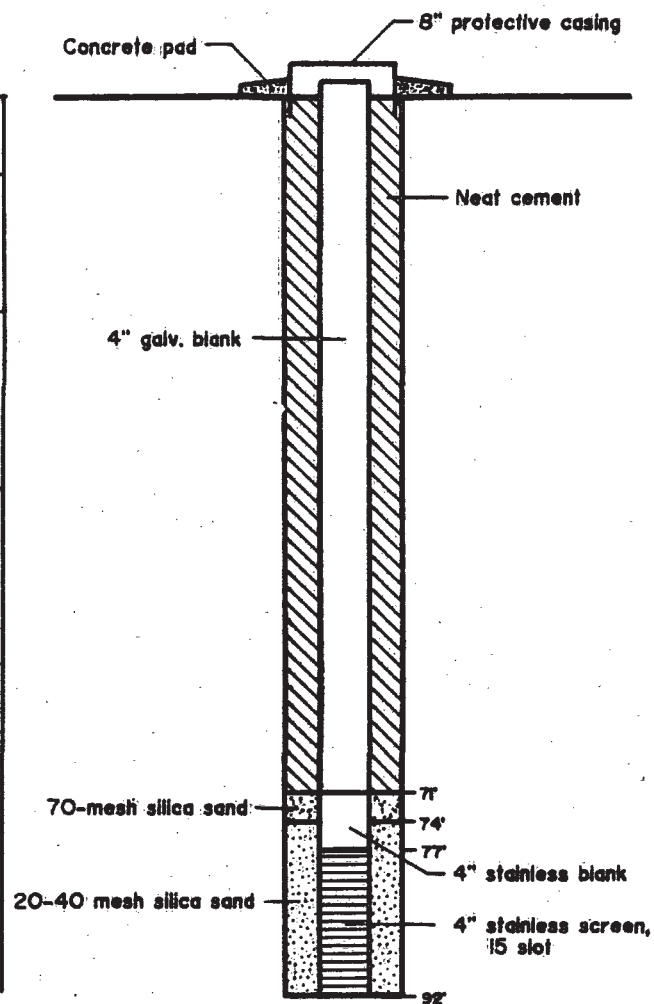
GW-26

- 0'-16': Silty sand. 60% sand, 30% silt, 10% clay. Sand is very fine to fine grained. Slow dilatancy, low plasticity. Grayish brown (10YR 5/2).
- 16'-108': Gravelly sand. 45% sand, 40% gravel, 15% silt. Sand is very fine to coarse grained. Gravel is quartzite with some igneous. Brown (10YR 5/3).
- 108'-124': Silty sandstone. Very fine grained quartz, some vitric ash. Grayish brown (2.5Y 5/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

		Qb	Sandy gravel
20			Silty claystone
40			Sandy claystone
60		Tcw	Silty sandstone
80			

TD=92'



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WELL GW-27

TOP OF CASING ELEV. = 4,853.09
GROUND SURFACE ELEV. = 4,850.54

STRATIGRAPHIC LOG

GW-27

- 0'-8': Sandy gravel. 70% gravel, 15% sand, 15% silt and clay. Gravel ranges from 1/4" to 1", rounded to angular, quartzite. Sand is very fine to coarse. Brown (10YR 5/3).
- 8'-22': Silty claystone. Contains 10% quartzite gravel, 1/4" to 3/8" diameter. Light yellowish brown (10YR 6/4).
- 22'-40': Sandy claystone. Sand is very fine grained, contains some vitric ash. Light brownish gray (10YR 6/2) grading to grayish brown (10YR 5/2) with depth.
- 40'-92': Silty sandstone. Very fine to medium grained, contains some vitric ash. 5% gravel is quartzite and igneous. Brown (10YR 5/3), light yellowish brown (2.5Y 6/3), pale brown 10YR 6/3).

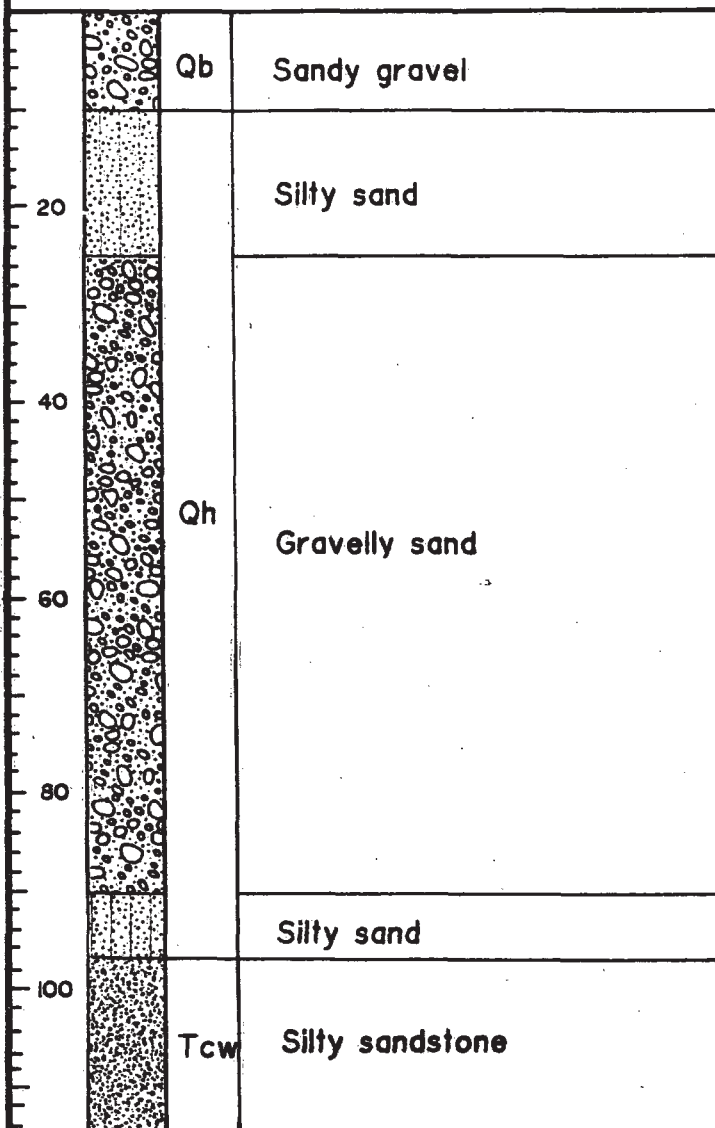
GEOLOGIC LOG

DEPTH (ft)

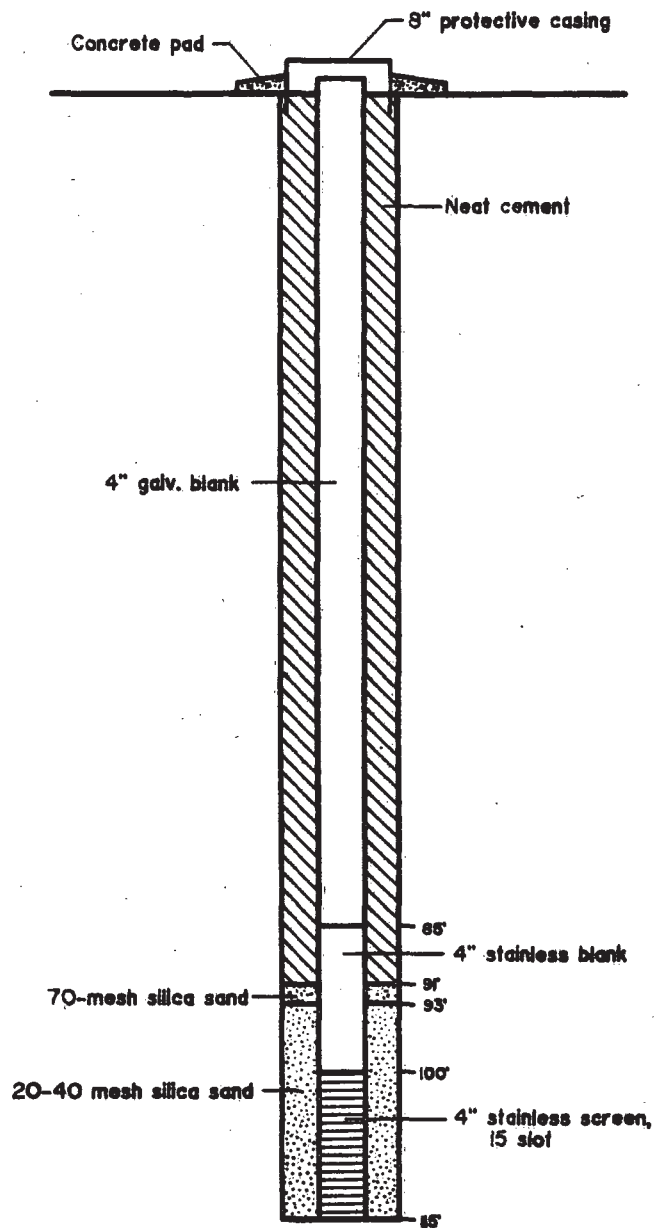
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



T.D.=15'



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HERCULES

BACCHUS WORKS

WELL GW-28

TOP OF CASING ELEV. = 4,819.08
GROUND SURFACE ELEV. = 4,816.85

STRATIGRAPHIC LOG

GW-28

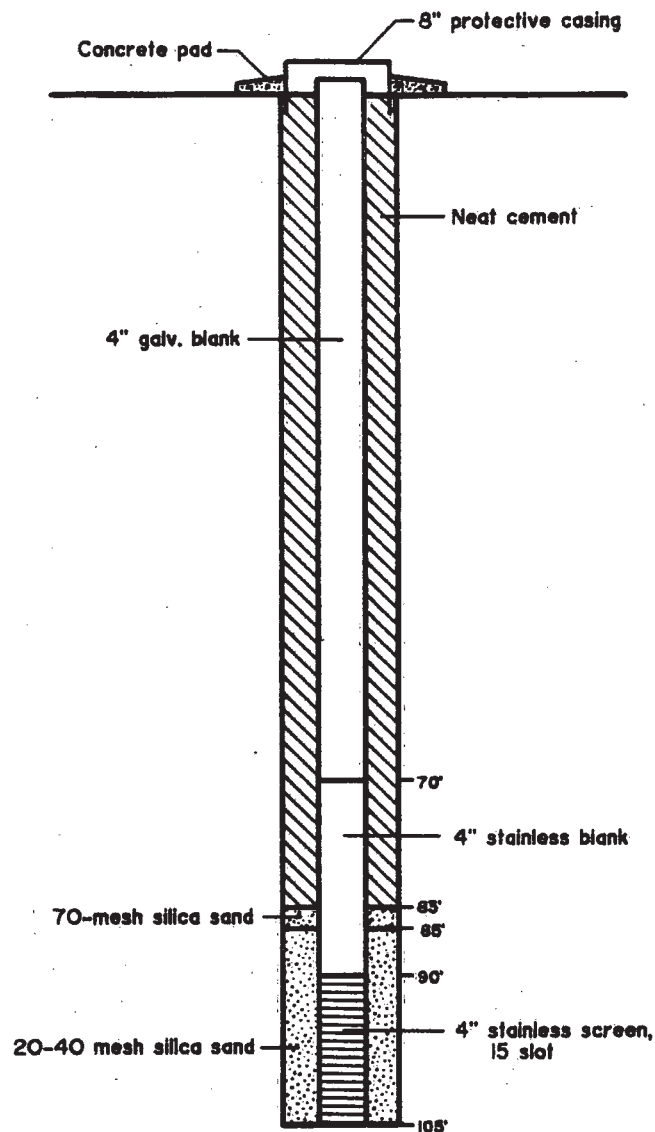
- 0'-10': Sandy gravel. 60% gravel, 25% sand, 15% silt. Gravel ranges from 1/4" to 6", with cobbles and boulders up to 2', subrounded to subangular, quartzite with some igneous. Sand is medium to coarse grained. Brown (10YR 5/3).
- 10'-25': Silty sand. 70% sand, 20% silt, 10% gravel. Sand is medium to coarse grained. Gravel is quartzite, limestone and igneous. Pale brown (10YR 6/3).
- 25'-40': Gravelly sand. 45% sand, 40% gravel, 15% silt and clay. Sand is fine to coarse grained. Gravel is quartzite, limestone and igneous. Very pale brown (10YR 7/4).
- 40'-50': Gravelly sand. 65% sand, 25% gravel, 10% silt. Sand is fine to medium grained with very few coarse grains. Gravel as above. Brown (10YR 5/3).
- 50'-75': Gravelly sand. 75% sand, 15% gravel, 10% silt and clay. Sand is medium to coarse grained. Gravel is quartzite. Pale brown (10YR 6/3).
- 75'-90': Gravelly sand. 65% sand, 20% gravel, 15% silt and clay. Sand is fine to medium grained. Gravel is 50% quartzite, 50% igneous. Pale brown (10YR 6/3).
- 90'-97': Silty sand. 75% sand, 10% silt, 10% clay, 5% gravel. Sand is very fine to very coarse grained. Gravel is quartzite. Pale brown (10YR 6/3).
- 97'-115': Silty sandstone. Very fine grained, contains some devitrified ash. Light brownish gray (2.5Y 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
	Qb	Gravelly sand
20		
40	Qh	Gravelly sand
60		
80		Silty sandstone
	Tcw	
100		Sand

TD=105'



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HERCULES

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WELL GW-29

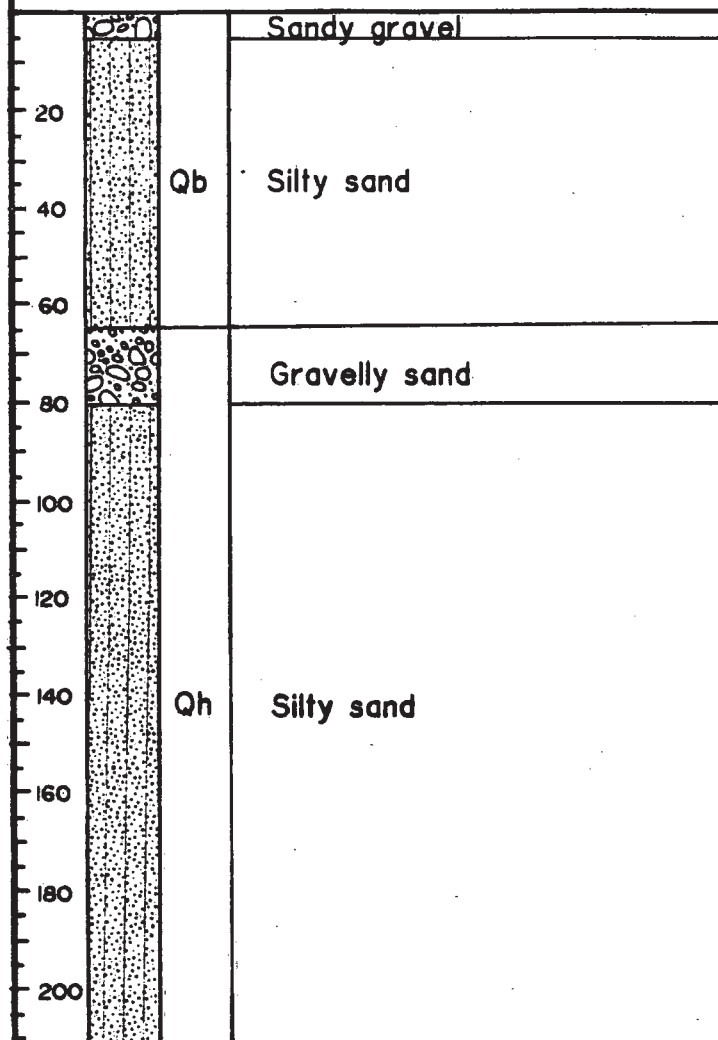
TOP OF CASING ELEV. = 4,819.22
GROUND SURFACE ELEV. = 4,816.17

STRATIGRAPHIC LOG

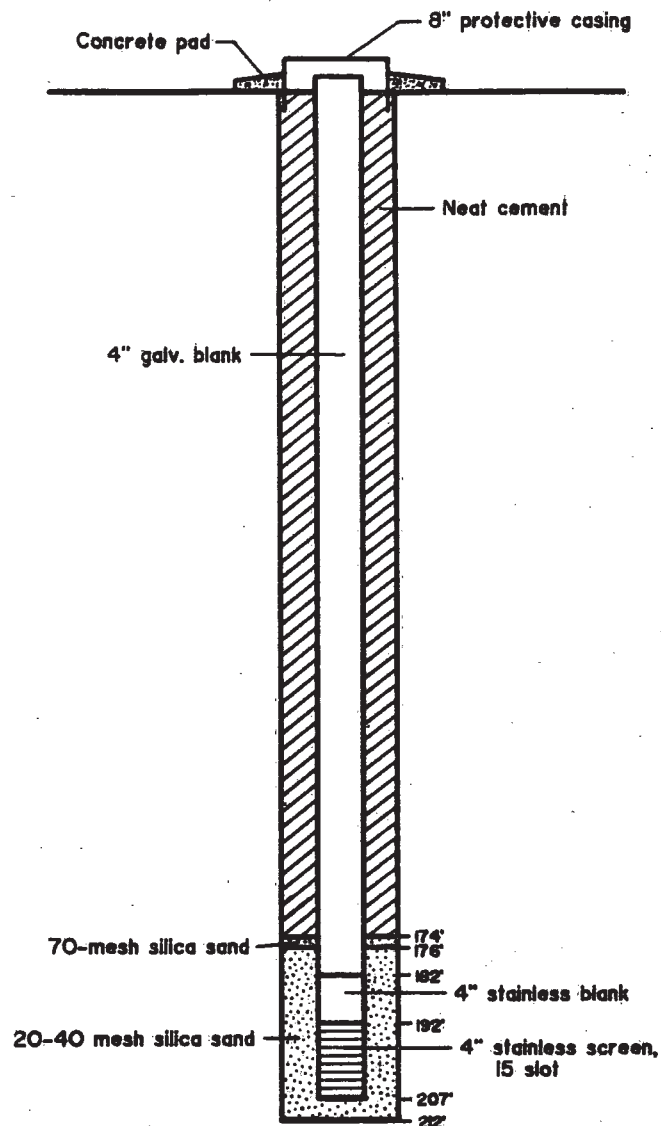
GW-29

- 0'-50': Gravelly sand. 50% sand, 40% gravel, 10% silt. Sand is very fine to coarse grained. Gravel is 1/4", subangular to subrounded, 50% quartzite, 50% igneous. Pale brown (10YR 6/3).
- 50'-55': Gravelly sand. 60% sand, 40% gravel. Sand is medium grained. Gravel ranges from 1/4" to 1/2", subrounded to rounded, quartzite. Pale brown (10YR 6/3).
- 55'-66': Gravelly sand. 70% sand, 20% gravel, 10% silt. Sand is medium grained. Gravel is quartzite. Brown (10YR 5/3).
- 66'-75': Silty sandstone. Sand is medium grained with <5% coarse grains. Brown (10YR 5/3).
- 75'-80': Silty sandstone as above but silt is vitric ash. Light brownish gray (2.5Y 6/2).
- 80'-90': Silty sandstone as above but pale brown (10YR 6/3).
- 90-105': Silty sand. Brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=212'



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HERCULES

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WELL GW-30

TOP OF CASING ELEV. = 4,662.88
GROUND SURFACE ELEV. = 4,660.27

STRATIGRAPHIC LOG

GW-30

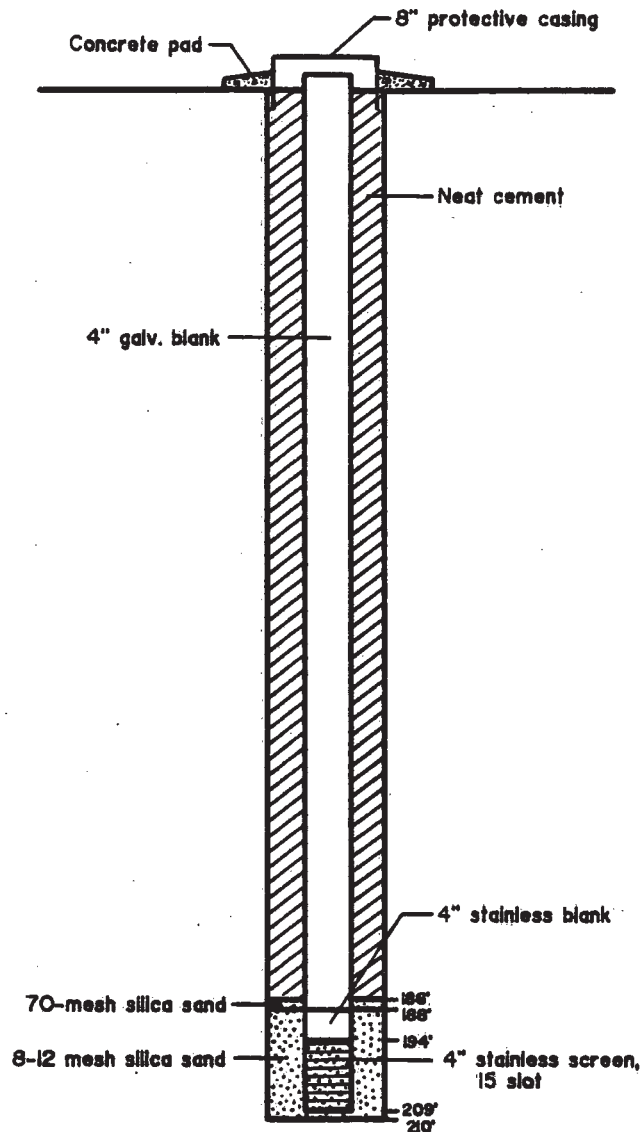
- 0'-5': Sandy gravel. 50% gravel, 35% sand, 15% silt. Gravel ranges from 1/4" to 2", subrounded to subangular, quartzite. Sand is very fine to coarse grained. Very dark grayish brown (10YR 3/2).
- 5'-20': Silty sand. 70% sand, 20% silt, 10% gravel. Sand is very fine to very coarse grained. Gravel ranges from 1/4" to 3/8", subangular to subrounded, quartzite. Brown (10YR 5/3).
- 20'-65': Silty sand. 65% sand, 25% silt, 10% clay. Sand is very fine to medium grained, contains some vitric ash. Brown (10YR 5/3).
- 65'-80': Gravelly sand. 50% sand, 35% gravel, 15% silt and clay. Sand is fine to very coarse grained. Gravel is quartzite. Light yellowish brown (10YR 6/4).
- 80'-212': Silty sand. 60% sand, 30% silt, 10% gravel. Sand is fine to very coarse. Gravel is mostly quartzite with some igneous. Red color increases with depth. Light brownish gray (10YR 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		Qb Gravelly sand
40		
60		
80		
100		Qh Gravelly sand
120		
140		
160		
180		
200		
210		

TD=210'



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HERCULES

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WELL GW-31

TOP OF CASING ELEV. = 4,672.53
GROUND SURFACE ELEV. = 4,669.92

STRATIGRAPHIC LOG

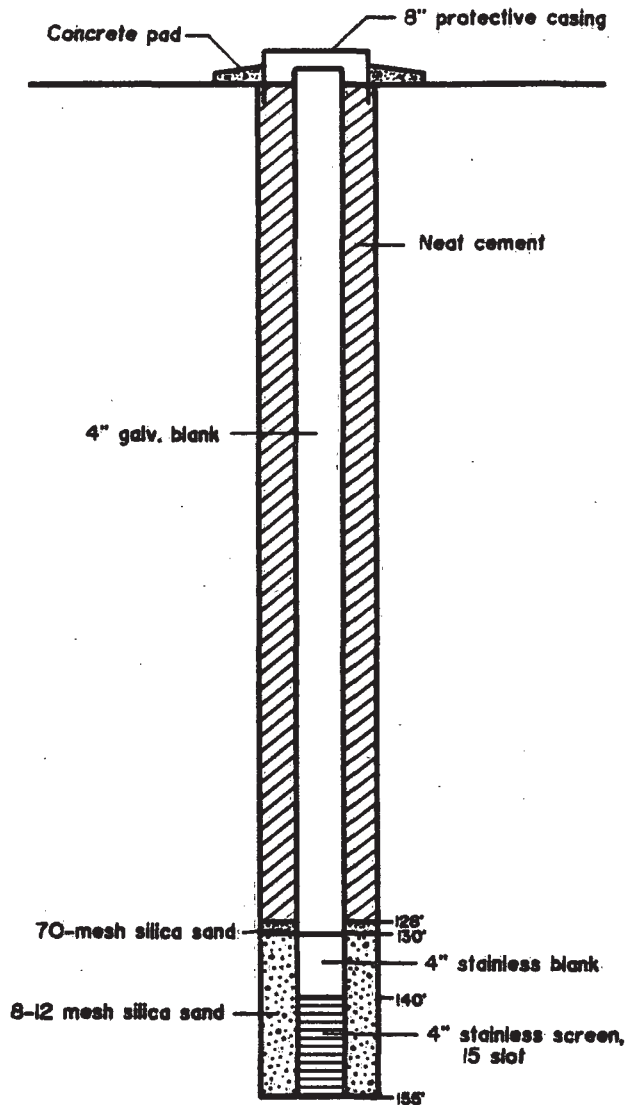
GW-31

- 0'-15': Gravelly sand. 55% sand, 30% gravel, 15% silt. Sand is coarse to fine grained. Gravel ranges from 1/4" to 1/2", subangular to subrounded, quartzite and limestone. Brown (10YR 5/3).
- 15'-100': Gravelly sand. 60% sand, 30% gravel, 10% silt. Sand is coarse to very fine grained. Gravel is mostly quartzite, some limestone and igneous. Light yellowish brown (10YR 6/4).
- 100'-115': Gravelly sand. 85% sand, 10% gravel, 5% silt. Sand is very fine to very coarse. Gravel is quartzite. Light yellowish brown (10YR 6/4).
- 115'-210': Gravelly sand. 50% sand, 30% gravel, 20% clay. Sand is very fine to very coarse. Gravel is quartzite. Yellowish brown (10YR 5/4).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		
40		
60		
80		
100		
120		
140		



TD=155'



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WELL GW-32

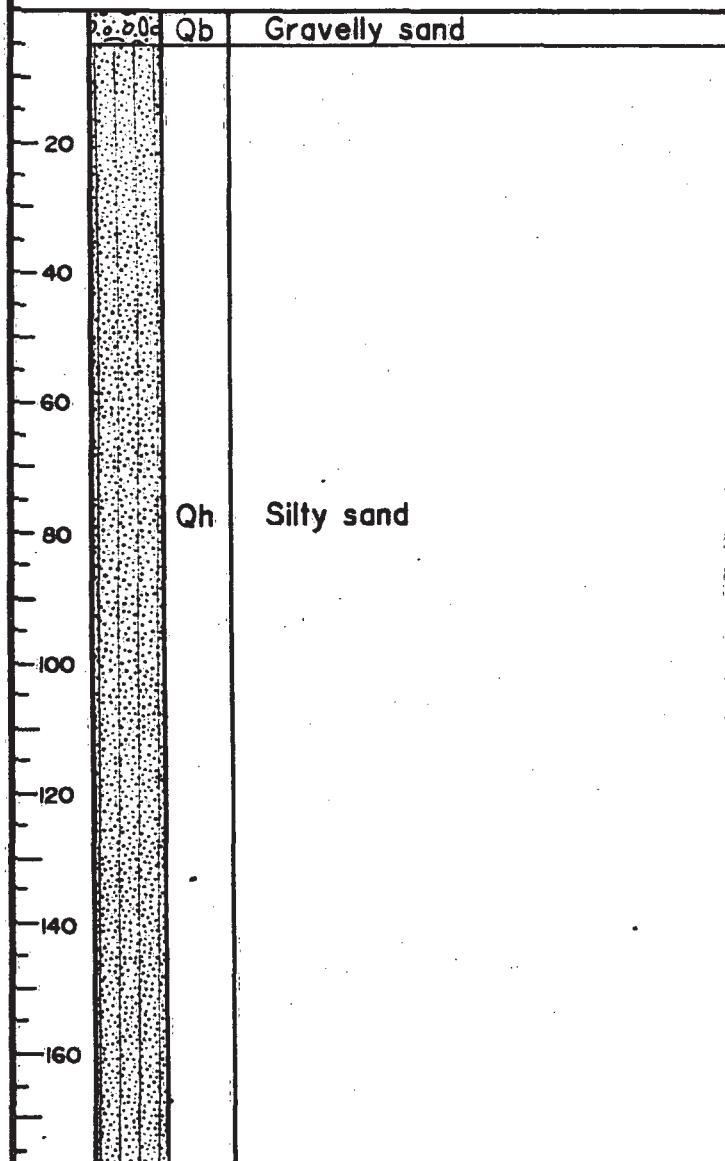
TOP OF CASING ELEV. = 4,610.06
GROUND SURFACE ELEV. = 4,607.30

STRATIGRAPHIC LOG

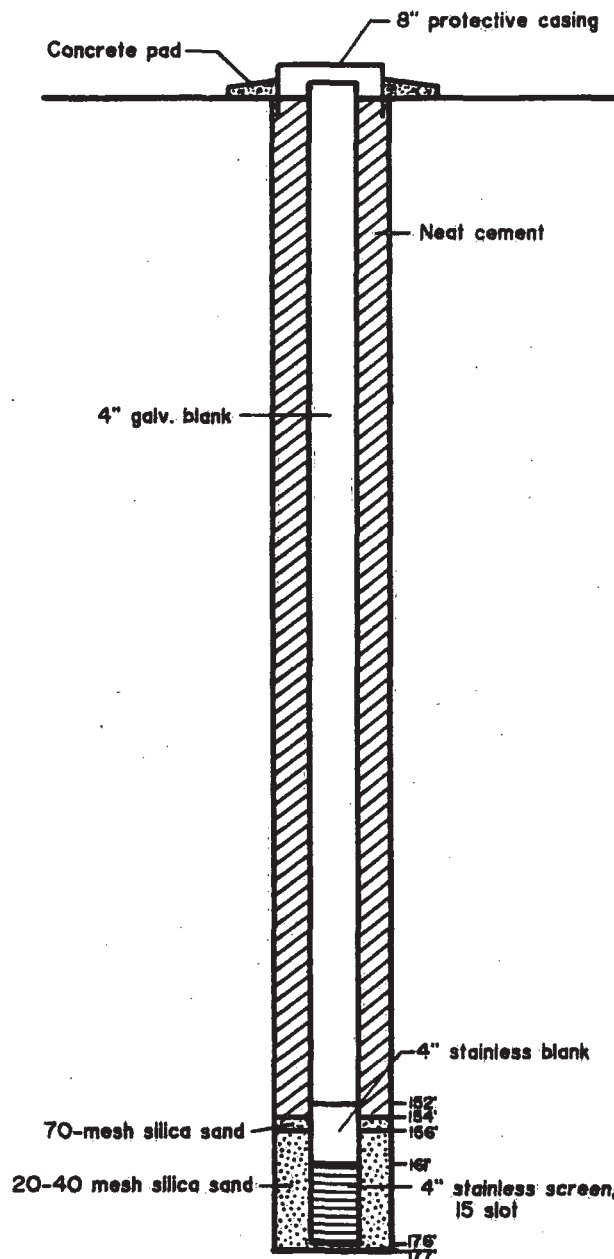
GW-32

- 0'-5': Sandy clay. 40% clay, 35% sand, 25% silt. Moderate to high dilatancy, moderate plasticity. Very dark grayish brown (10YR 3/2).
- 5'-15': Gravelly sand. 50% sand, 30% gravel, 20% silt. Sand is very fine to coarse. Gravel ranges from 1/4" to 3/4", subangular to subrounded. Brown (10YR 5/3).
- 15'-75': Gravelly sand. 50% sand, 30% gravel, 15% silt, 5% clay. Sand is very fine to coarse. Gravel is quartzite, limestone and igneous. Yellowish brown (10YR 5/4).
- 75'-125': Gravelly sand. 65% sand, 25% gravel, 10% silt. Sand is very fine to medium grained. Gravel as above. Light brownish gray (10YR 6/2).
- 125'-155': Silty sand. 55% sand, 35% silt, 10% gravel. Sand ranges from fine to medium grained. Brown (10YR 5/3).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=177'



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WELL GW-33

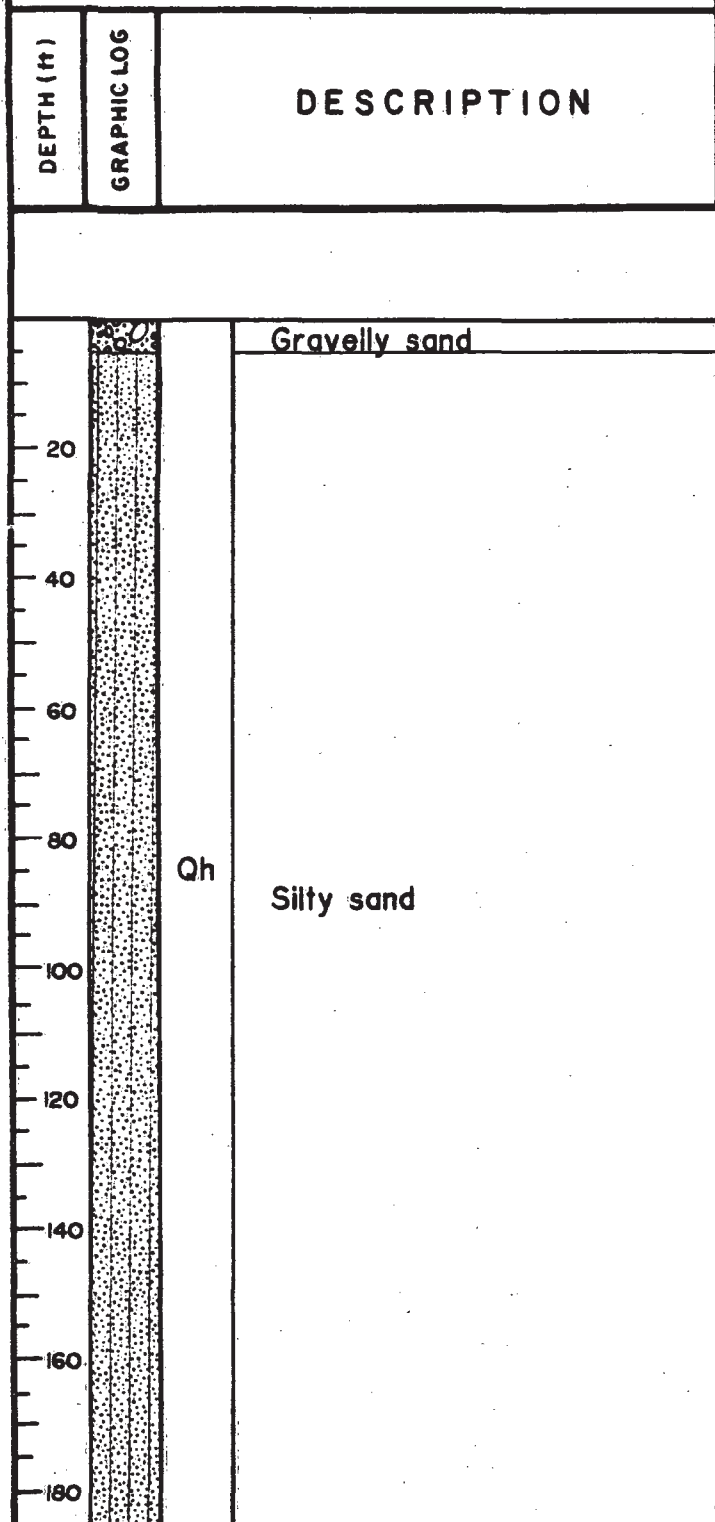
TOP OF CASING ELEV. = 4,598.93
GROUND SURFACE ELEV. = 4,596.44

STRATIGRAPHIC LOG
GW-33

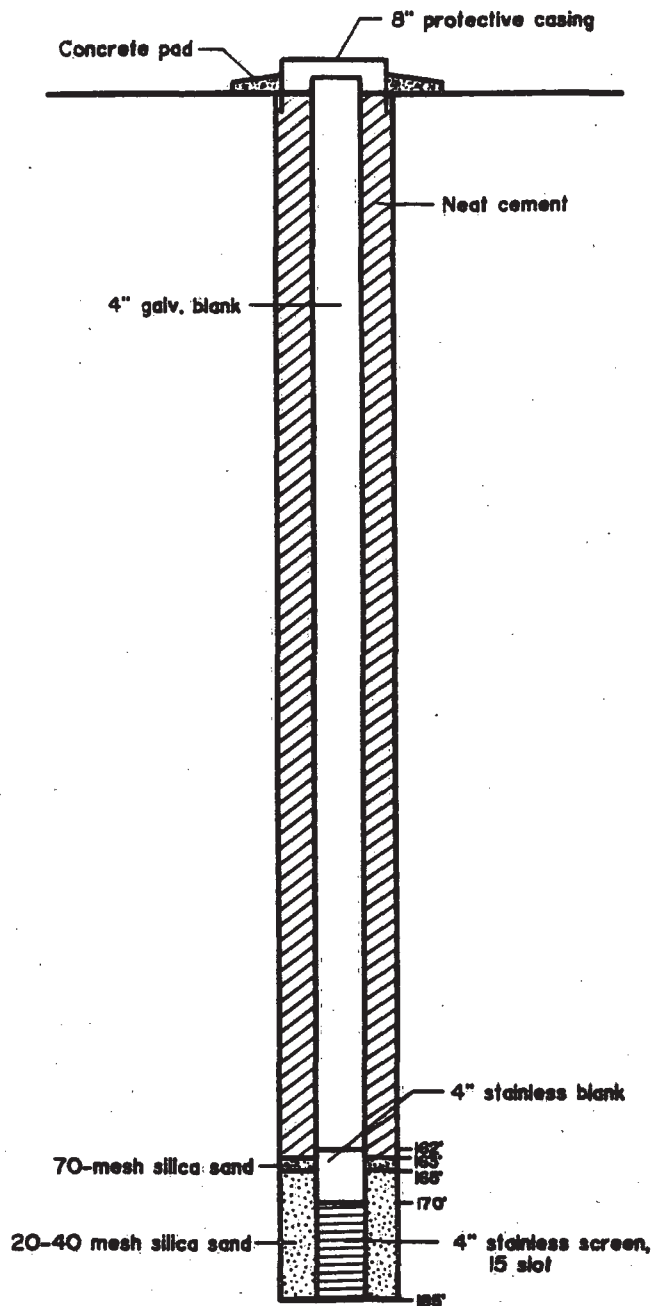
- 0'-5': Gravelly sand. 60% sand, 25% gravel, 15% silt. Sand is very fine to coarse grained. Gravel ranges from 1/4" to 1/2", igneous and quartzite, subangular to subrounded. Dark brown (10YR 3/3).
- 5'-180': Silty sand. 55% sand, 25% silt, 20% gravel. Sand is very fine to coarse grained. Gravel is igneous and quartzite. Light yellowish brown (10YR 6/4).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



TD=185'



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HERCULES

BACCHUS
WORKS

WELL GW-34

TOP OF CASING ELEV. = 4,587.74
GROUND SURFACE ELEV. = 4,585.88

STRATIGRAPHIC LOG

GW-34

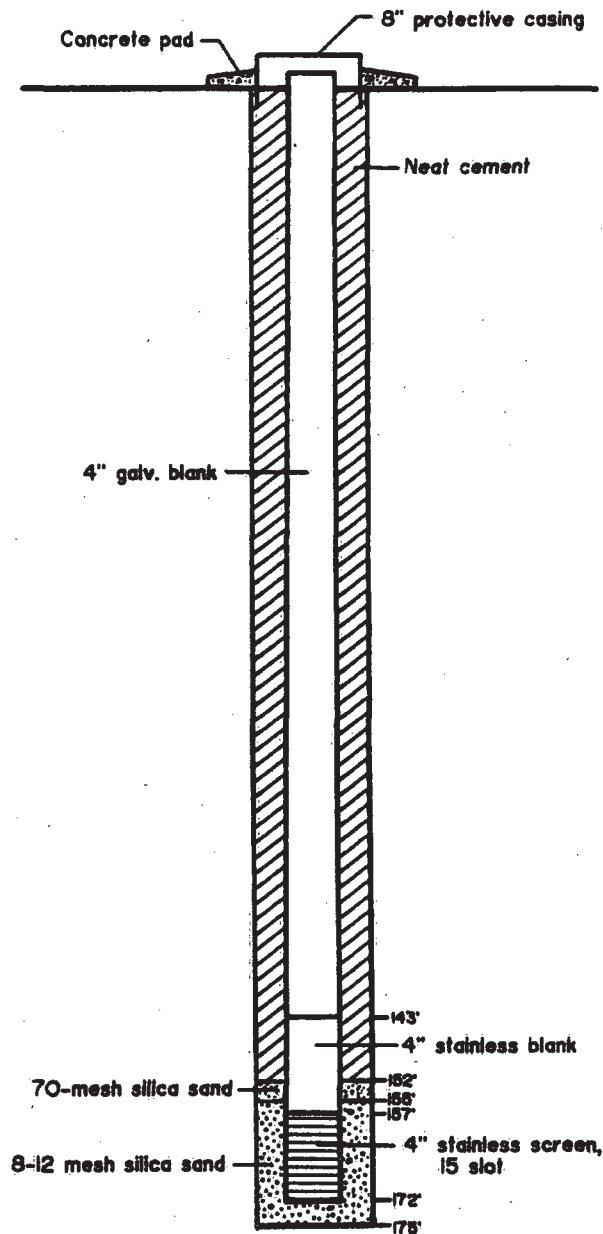
- 0'-5': Gravelly sand. 50% sand, 40% gravel, 10% silt. Sand is very fine to coarse grained. Gravel ranges from 1/4' to 1/2", subangular to subrounded. Dark brown (10YR 3/3).
- 5'-185': Silty sand. 65% sand, 25% silt, 10% gravel. Sand is very fine to coarse. Gravel is quartzite, limestone, igneous and some chert. Light yellowish brown (10YR 6/4).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Sandy silt
20	Qb	Gravelly sand
40		
60		
80	Qh	Silty sand
100		
120		
140		
160		

TD=175'



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HERCULES

BACCHUS
WORKS

WELL GW-35

TOP OF CASING ELEV. = 4,587.40
GROUND SURFACE ELEV. = 4,585.45

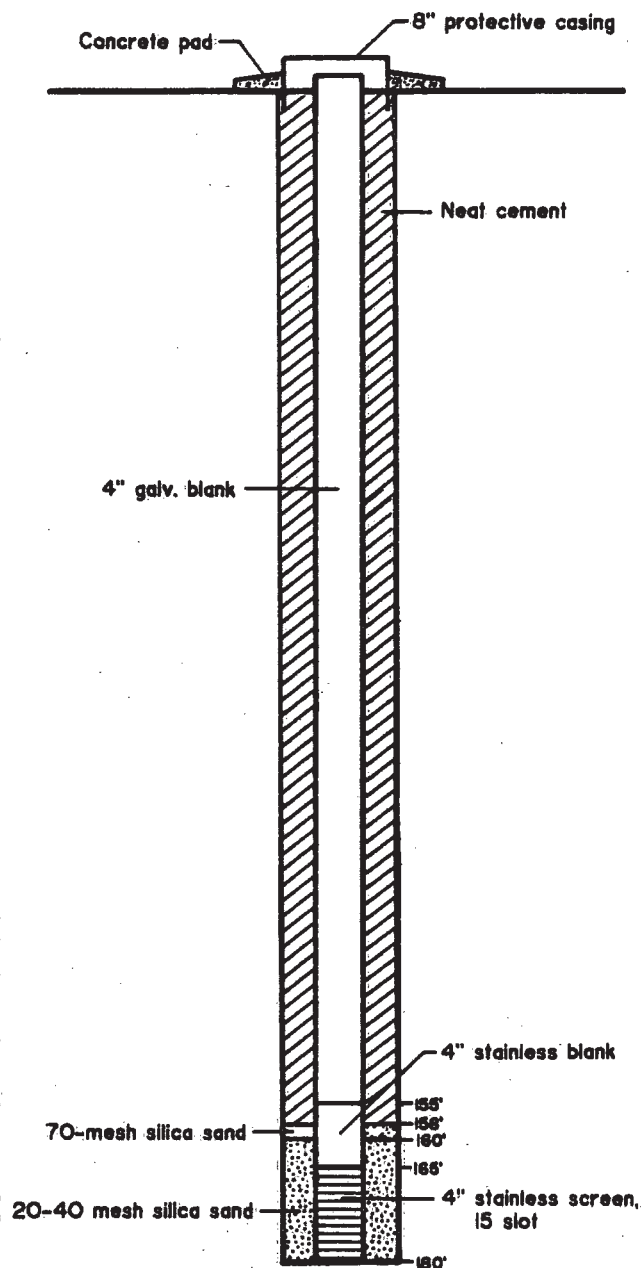
STRATIGRAPHIC LOG
GW-35

- 0'-5': Sandy silt. 45% silt, 30% sand, 25% gravel. Sand is very fine to coarse. Gravel ranges from 1/4" to 3/4", subangular to subrounded. Dark brown (10YR 3/3).
- 5'-20': Gravelly sand. 45% sand, 40% gravel, 15% silt. Sand is medium to coarse grained. Gravel ranges from 1/4" to 3/8", subangular to subrounded, quartzite. Light yellowish brown (10YR 6/4).
- 20'-175': Silty sand. 50% sand, 25% silt, 25% gravel. Sand is very fine to coarse. Gravel is mostly quartzite, also limestone, igneous and chert. Light yellowish brown (10YR 6/4).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

		Qb	Gravelly silt
20			
40			
60			
80		Qh	Gravelly sand
100			
120			
140			
160			

TD=180'



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HERCULES

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WELL GW-36

TOP OF CASING ELEV. = 4,583.91
GROUND SURFACE ELEV. = 4,581.65

STRATIGRAPHIC LOG

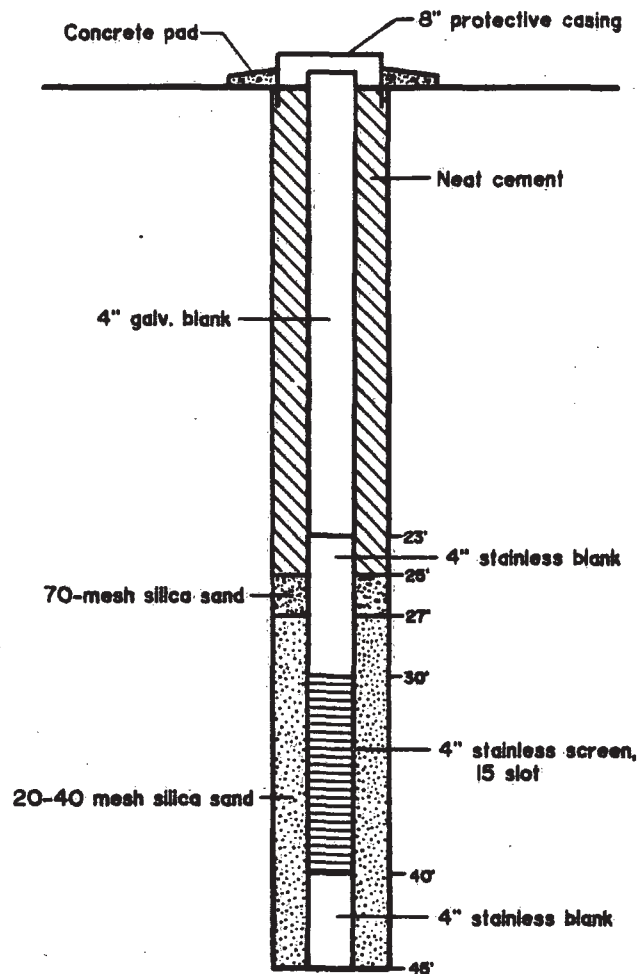
GW-36

- 0'-15': Gravelly silt. 50% silt, 35% gravel, 10% sand, 5% clay. Sand is medium to coarse grained. Gravel is 1/4", subrounded to subangular, quartzite. Brown (10YR 5/3).
- 15'-180': Gravelly sand. 50% sand, 25% gravel, 15% silt, 10% clay. Sand is very fine to coarse grained. Gravel is quartzite, limestone and igneous.

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

10		
20	Qh	Gravelly sand
30		
40	Tjn	Volvic tuff

TD=45'



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HERCULES

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WELL GW-37

TOP OF CASING ELEV. = 4,557.64
GROUND SURFACE ELEV. = 4,575.44

STRATIGRAPHIC LOG
GW-37

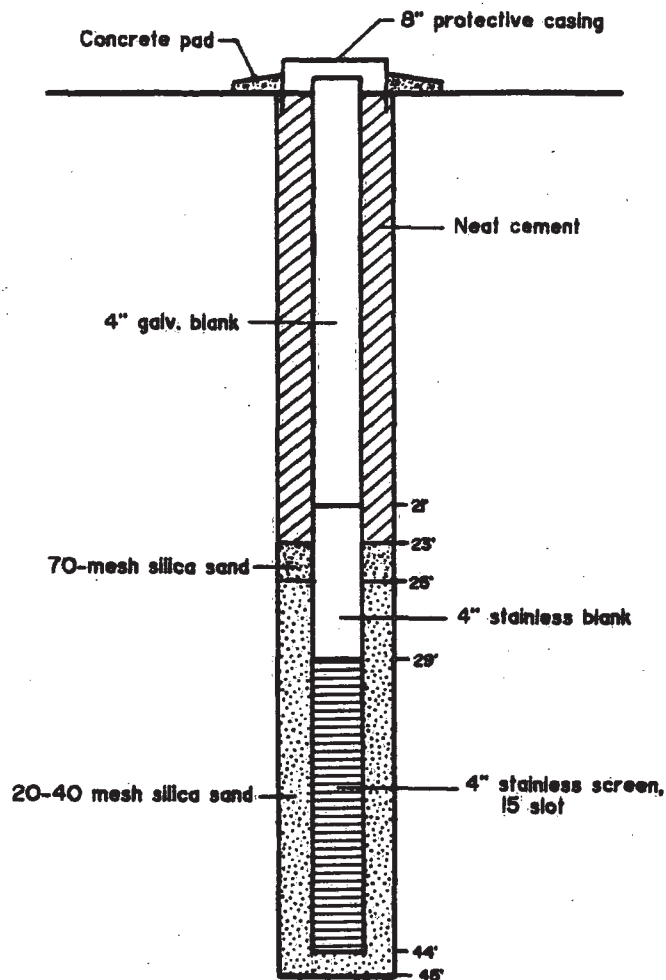
- 0'-35': Gravelly sand. 60% sand, 30% gravel, 10% silt. Sand is very fine to coarse. Gravel ranges from 1/4" to 2", subangular to subrounded, mostly quartzite. Some cobbles are present in this interval. Brown (10YR 5/3).
- 35'-40': Vitric tuff. Very fine grained. Contains some very fine quartz grains. Light brownish gray (2.5Y 6/2).
- 40'-45': Vitric tuff as above but moderately devitrified. Clay is bentonitic. Light olive gray (5Y 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
10		Sandy silt
20		
30	Qh	Silty sand
40		

TD=45'



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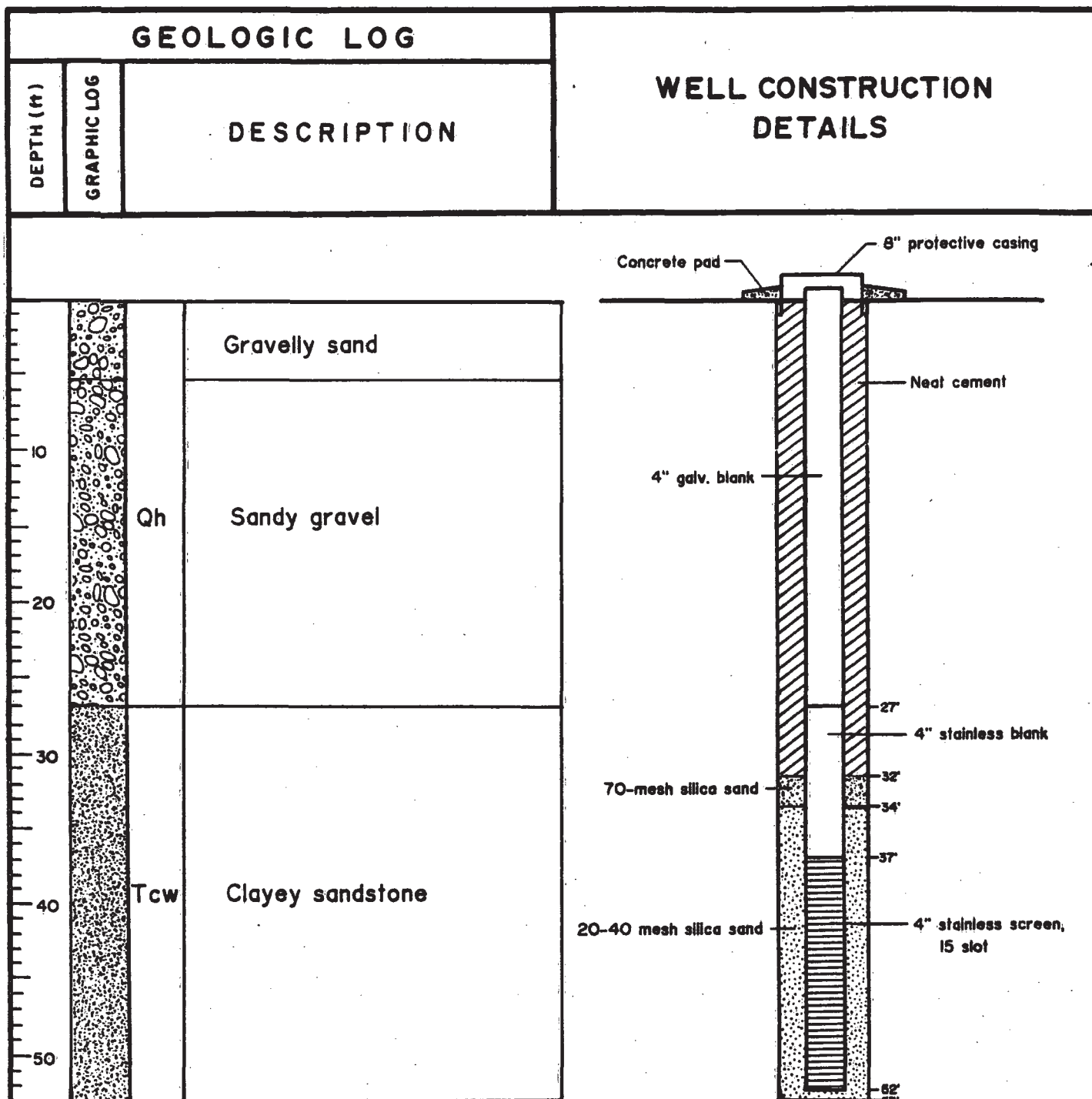
WELL GW-38

TOP OF CASING ELEV. = 4,578.03
GROUND SURFACE ELEV. = 4,575.39

STRATIGRAPHIC LOG

GW-38

- 0'-5': Sandy silt. 40% silt, 35% sand, 25% gravel. Sand is very fine to medium grained. Gravel ranges from 1/4" to 2", subangular to subrounded, quartzite. Dark brown (10YR 3/3).
- 5'-44.6': Silty sand. 68% sand, 30% silt, 2% gravel. Sand is very fine to very coarse. Gravel is quartzite with some igneous. Yellowish brown (10YR 5/4).
- 44.6'-45': Silty sand. 70% sand, 20% silt, 10% gravel. Sand is very fine grained. Gravel as above. Light brownish gray (2.5Y 6/2).



TD=53'



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WELL GW-39

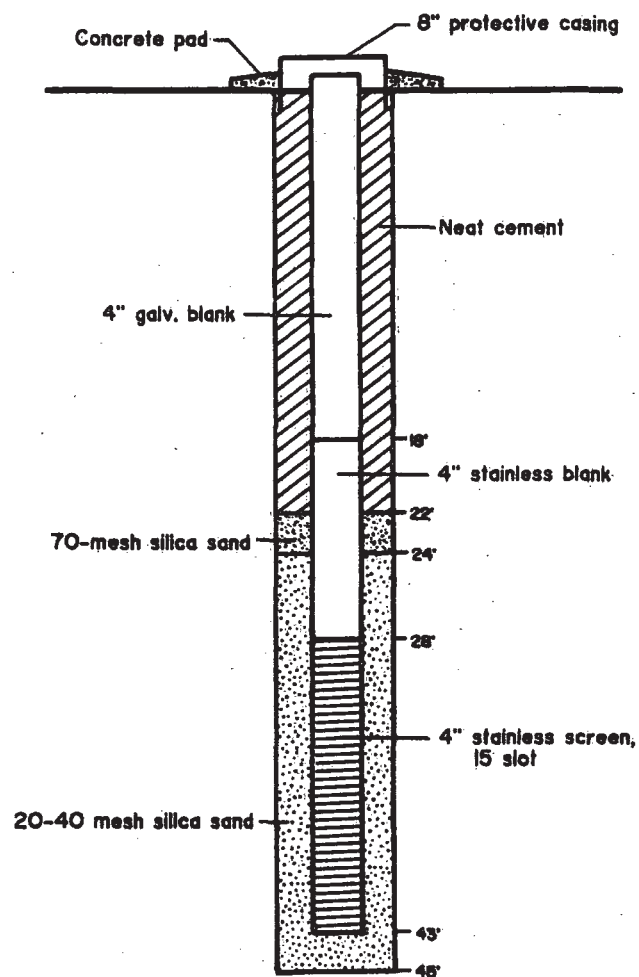
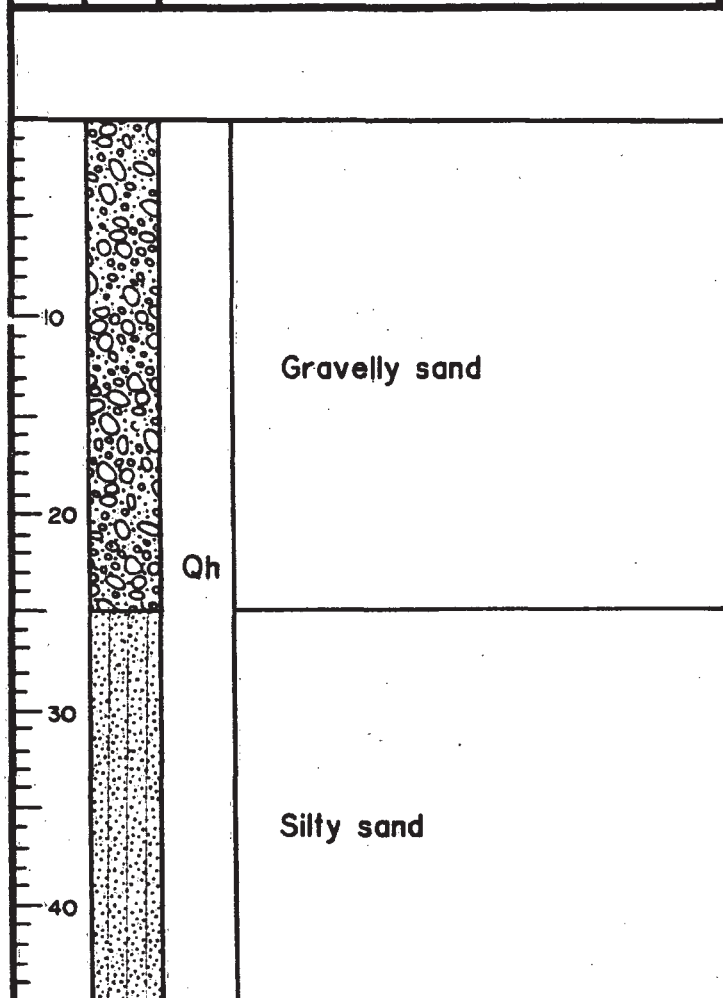
TOP OF CASING ELEV. = 4,626.08
GROUND SURFACE ELEV. = 4,623.14

STRATIGRAPHIC LOG

GW-39

- 0'-5': Gravelly sand. 60% sand, 25% gravel, 10% silt, 5% clay. Sand is very fine to coarse. Gravel 1/4", subangular to subrounded, quartzite. Dark brown (10YR 3/3).
- 5'-27': Sandy gravel. 65% gravel, 20% sand, 15% silt. Gravel is quartzite, limestone and some igneous. Pale brown (10YR 6/3).
- 27'-53': Clayey sandstone. Very fine grained. Weak red (2.5YR 5/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



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WELL GW-40

TOP OF CASING ELEV. = 4,575.55
GROUND SURFACE ELEV. = 4,573.40

STRATIGRAPHIC LOG

GW-40

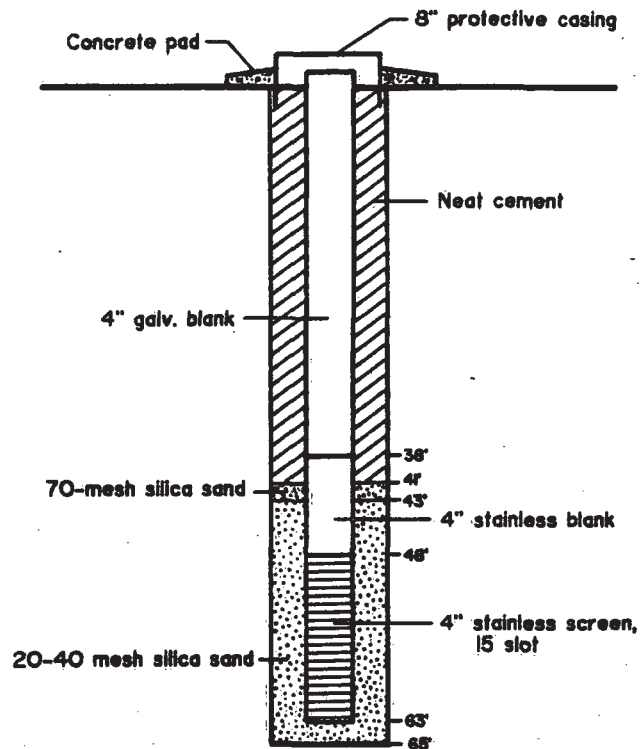
- 0'-25': Gravelly sand. 50% sand, 40% gravel, 10% silt. Sand is very fine to very coarse grained, gravel is quartzite and igneous. Brown (10YR 5/3).
- 25'-45': Silty sand. 50% sand, 30% silt, 10% gravel, 10% clay. Sand is very fine to very coarse. Gravel is quartzite with a few igneous. Strong brown (7.5YR 5/6).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		
20	Qh	Gravelly sand
40	Tcw	Clayey siltstone
60		Sandy siltstone

TD=65'



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WELL GW-41

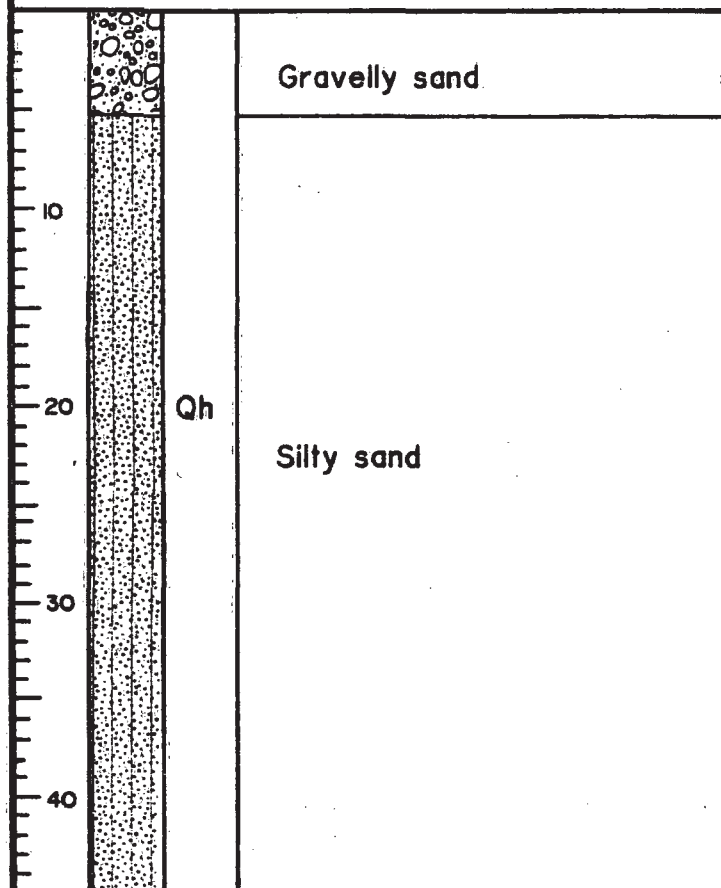
TOP OF CASING ELEV. = 4,599.80
GROUND SURFACE ELEV. = 4,597.66

STRATIGRAPHIC LOG

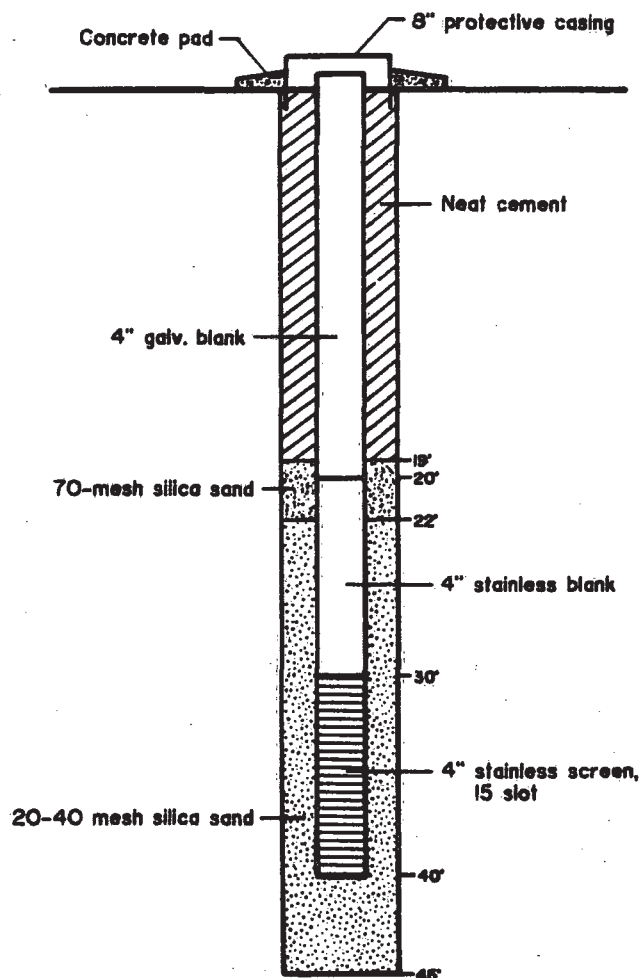
GW-41

- 0'-10': Gravelly sand. 60% sand, 25% gravel, 15% silt and clay. Sand is fine to very coarse. Gravel is 1/4" to 1/2", angular to subangular quartzite, limestone and igneous. Brown (10YR 5/3).
- 10'-20': Gravelly sand. 60% sand, 25% gravel, 15% silt. Sand is fine to very coarse grained. Gravel as above. Light yellowish brown (10YR 6/4).
- 20'-54': Clayey siltstone. Contains some fine grained vitric ash. Reddish yellow (7.5YR 6/8).
- 54'-65': Sandy siltstone. Sand is very fine to medium grained. Yellowish brown (10YR 5/4).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=45'



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HERCULES

BACCHUS
WORKS

WELL GW-42

TOP OF CASING ELEV. = 4,579.55
GROUND SURFACE ELEV. = 4,577.22


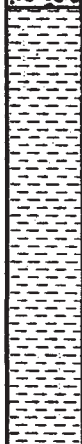


STRATIGRAPHIC LOG

GW-42

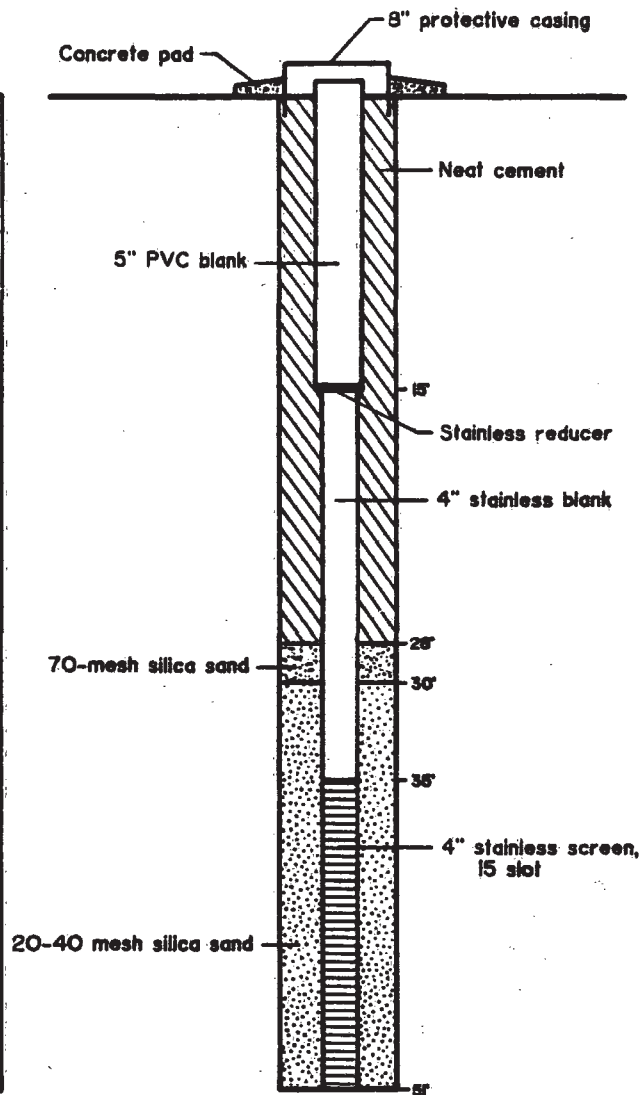
- 0'-5': Gravelly sand. 60% sand, 25% gravel, 15% silt. Sand is very fine to coarse grained. Gravel ranges from 1/4" to 2", subangular to subrounded, quartzite with some igneous. Dark grayish brown (10YR 4/2).
- 5'-40': Silty sand. 60% sand, 30% silt, 10% gravel. Sand is fine to coarse grained. Gravel is quartzite and igneous. Brown (10YR 5/3).
- 40'-45': Silty sand. 60% sand, 30% silt, 10% gravel. Sand is very fine to medium grained. Gravel is quartzite. Yellowish brown (10YR 5/6).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
10		Qb Sandy gravel
20		Tjn Clayey siltstone
40		Sandy claystone
50		Silty sandstone

TD=51'



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HERCULES

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WELL GW-43

TOP OF CASING ELEV. = 4,817.39
GROUND SURFACE ELEV. = 4,815.06

STRATIGRAPHIC LOG

GW-43

- 0.0'-7.0': Sandy gravel. 50% gravel, 30% sand, 10% cobbles, 10% silt. Gravel is subrounded to subangular quartzite. Sand is medium to coarse grained. Cobbles are 3" to 12", subrounded, quartzite. Silty matrix reacts strongly to HCl. Very dark grayish brown (10YR 3/2).
- 7.0'-12.5' Sandy gravel. 60% gravel, 20% sand, 10% silt, 5% cobbles, 5% clay. Gravel is subrounded to subangular, quartzite and sandstone. Sand is medium to coarse grained, subrounded to subangular. Silt matrix reacts strongly to HCl. Brown (10YR 5/3).
- 12.5'-35.0': Clayey siltstone. Contains 15% fine to coarse grained sand, mostly quartz, some dark minerals. Weak reaction to HCl. Brown (10YR 5/3) to grayish brown (2.5Y 5/2) with depth.
- 35.0'-46.0': Sandy claystone. Sand is predominantly very fine grained with some very coarse grains. Coarse sand fraction is subangular to subrounded quartz with some dark minerals. Some sand is iron stained. Moderate to weak reaction to HCl. Brown (10YR 5/3).
- 46.0'-51.0': Silty sandstone. Sand is very fine to coarse grained, rounded quartz. Weak reaction to HCl. Yellowish brown (10YR 5/4).

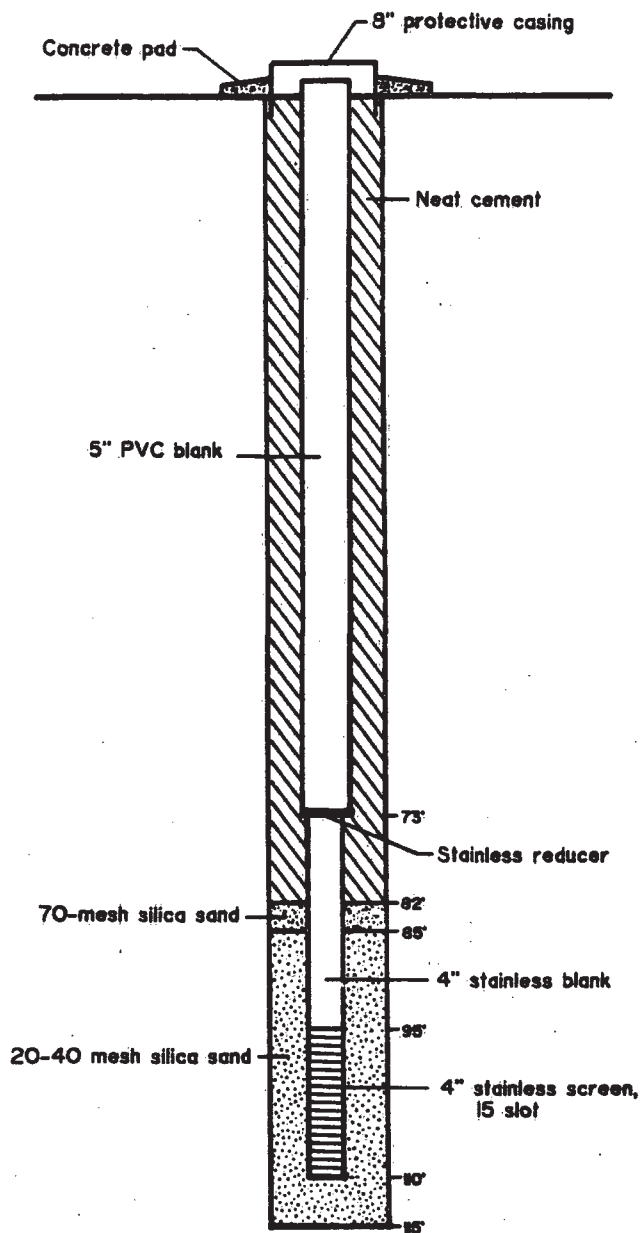
GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		Sandy gravel
40		Silty sand
60		Silty sand
80		Sandy gravel
100		Silty sand

Qh

TD=115'



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HERCULES

BACCHUS
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WELL GW-44

TOP OF CASING ELEV. = 4,899.66
GROUND SURFACE ELEV. = 4,897.22

STRATIGRAPHIC LOG

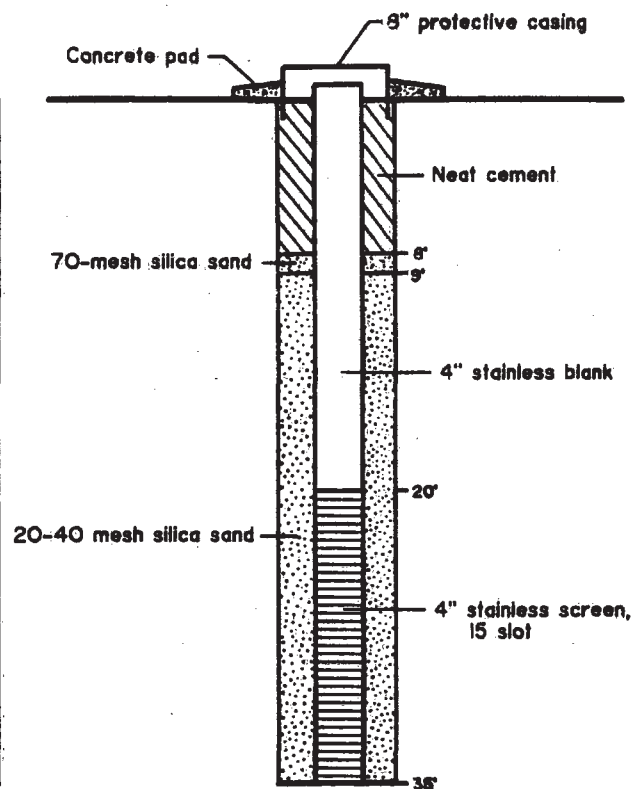
GW-44

- 0.0'-25.0': Sandy gravel. 50% gravel, 25% sand increasing to 30% with depth, 15% silt, 10% clay decreasing to 5% with depth. Gravel is subrounded to subangular quartzite, sandstone, and dark limestone. Sand is very fine to very coarse grained. The fine to medium grained sand fraction contains up to 50% vitric ash. Silt is vitric ash. Clay is altered vitric ash. Strong reaction to HCl. Brown (10YR 5/3).
- 25.0'-70.0': Silty sand. 85% sand, 15% silt grading with depth to 55% sand, 30% gravel, 15% silt, trace of clay. Sand is very fine to coarse grained (predominantly fine grained). The very fine to fine grained sand is rounded quartz. Up to 30% of the interval is vitric ash. Gravel is subangular to subrounded quartzite with small amounts of sandstone, siltstone, andesite-latite and tuff. Strong reaction to HCl. Brown (10YR 5/3).
- 70.0'-84.0': Sandy gravel. 55% gravel, 35% sand, 10% silt, grading with depth to 40% gravel, 35% sand, 15% silt, 10% clay. Gravel is subrounded to subangular quartzite and sandstone, with some andesite-latite. Sand is very fine to very coarse grained (predominantly medium to very coarse). The fine grained sand is rounded to subangular quartz with up to 30% rounded vitric ash. Some iron and manganese staining. Clay is altered vitric ash. Strong reaction to HCl. Brown (10YR 5/4), yellowish brown (10YR 5/4).
- 84.0'-115.0': Silty sand. 65% sand, 20% silt, 10% gravel, 5% clay, with a few cobbles and boulders. Sand is very fine to very coarse grained, rounded to subangular quartz, dark minerals and vitric ash. Medium to fine grained sand contains up to 50% ash in some zones. Gravel is predominantly quartzite, with minor amounts of sandstone, siltstone and andesite-latite. Strong reaction to HCl. Light brown (10YR 6/3), brown (10YR 5/3), grayish brown (2.5Y 4/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

10	Qb	Silty sand
20	Tjn	Voltric tuff
30		

TD=35'



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HERCULES

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WELL GW-45



TOP OF CASING ELEV. = 4,748.60
GROUND SURFACE ELEV. = 4,746.95

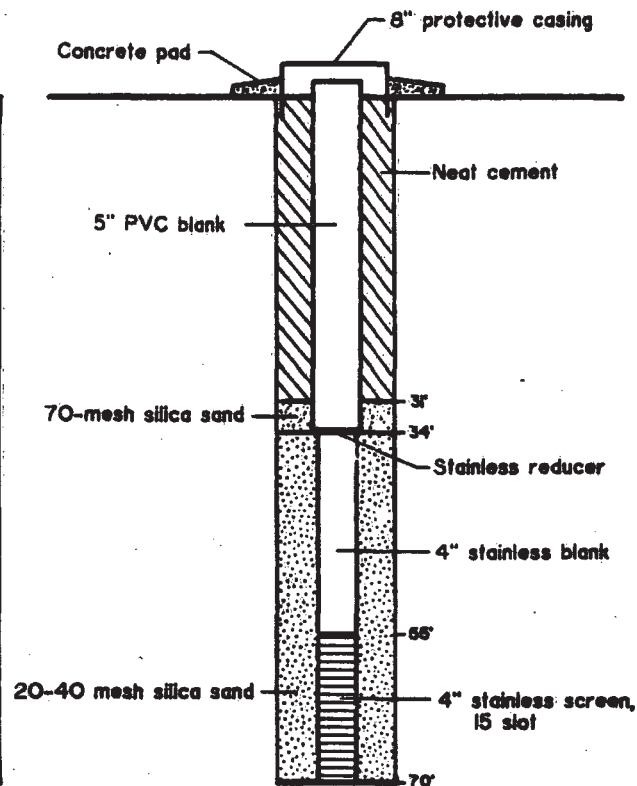
STRATIGRAPHIC LOG
GW-45

- 0.0'-3.0': Silty sand. 50% sand, 30% gravel, 20% silt. Sand is very fine to coarse grained, rounded to subrounded quartz. Gravel is subrounded to subangular quartzite. Very dark brown (10YR 2/2).
- 3.0'-25.0': Vitric tuff. 5% quartzite gravel with depth. Moderately to highly devitrified. Larger tuff fragments are laminated. Clay is randomly iron stained. Strong reaction to HCl. Pale olive (5Y 6/4) and white (5Y 8/2).
- 25.0'-35.0': Vitric tuff. Contains some very fine to fine grained quartz and chalky grains. Moderately devitrified. Strong reaction to HCl. Pale yellow (5Y 7/3), light gray (5Y 7/2) with depth.

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Qb Silty gravel
20		Tjn Vitric tuff
40		
60		



TD=70'



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WELL GW-46

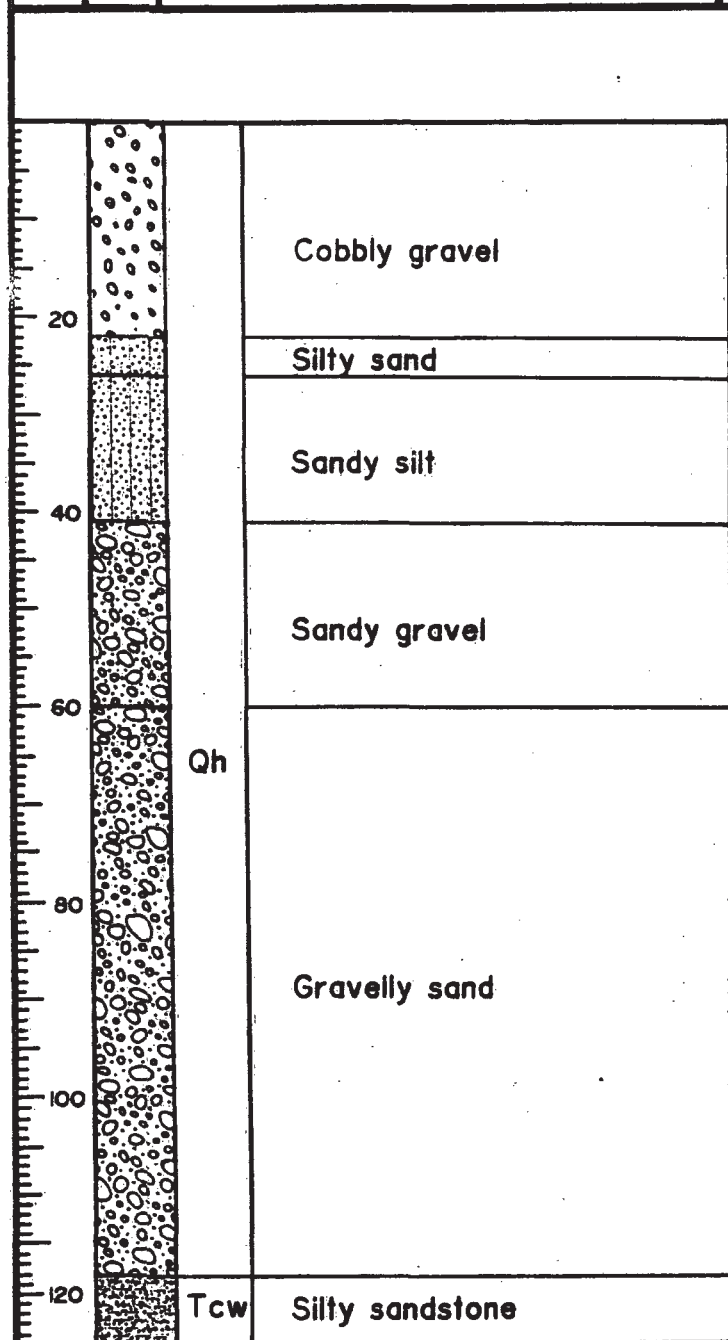
TOP OF CASING ELEV. = 4,699.70
GROUND SURFACE ELEV. = 4,697.80

STRATIGRAPHIC LOG

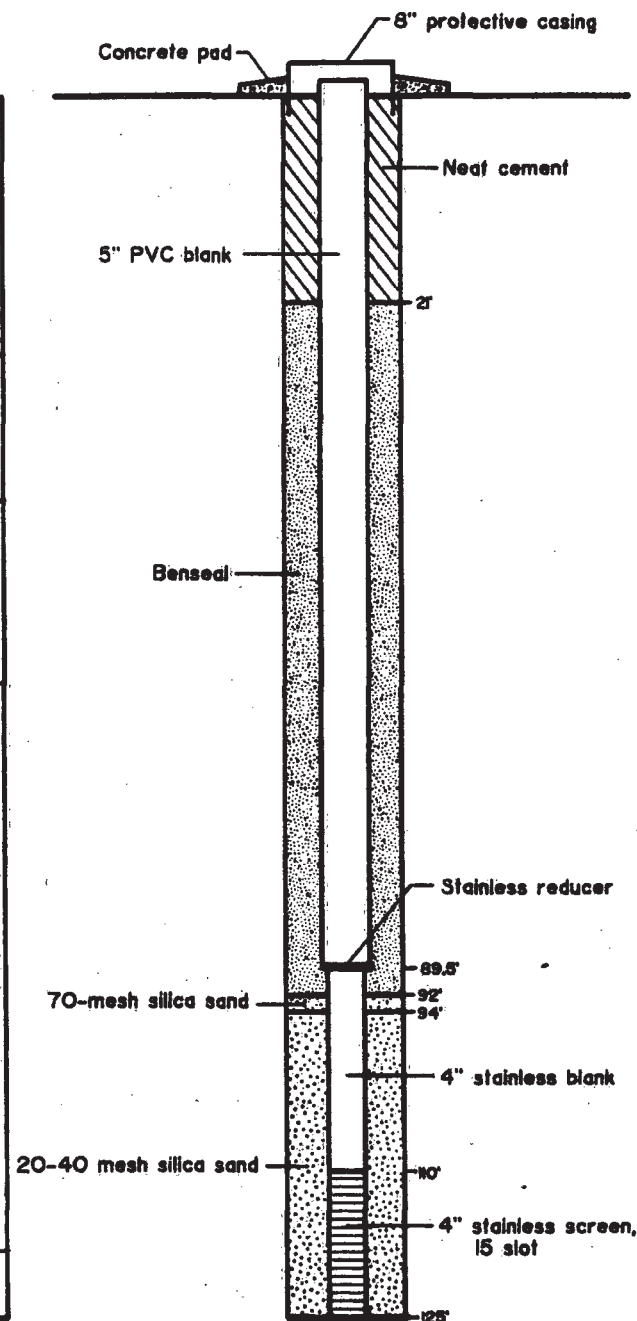
GW-46

- 0.0'-8.0': Silty gravel. 60% gravel, 20% silt, 15% sand, 5% clay. Gravel is subangular to sub-rounded quartzite, sandstone and chert. Sand is very fine to coarse grained, subrounded, quartz. Carbonate coats on larger clasts. Strong reaction to HCl. Dark brown (10YR 3/3).
- 8.0'-70.0': Vitric tuff. Drilling rates suggest alternating thin beds of tuff and clay. Contains some very fine to fine grained quartz sand and dark minerals. Strong reaction to HCl. Pale olive (5Y 6/3) to olive gray (5Y 5/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



TD=125'



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HERCULES

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WELL GW-47

TOP OF CASING ELEV. = 4,799.22
GROUND SURFACE ELEV. = 4,797.39

STRATIGRAPHIC LOG

GW-47

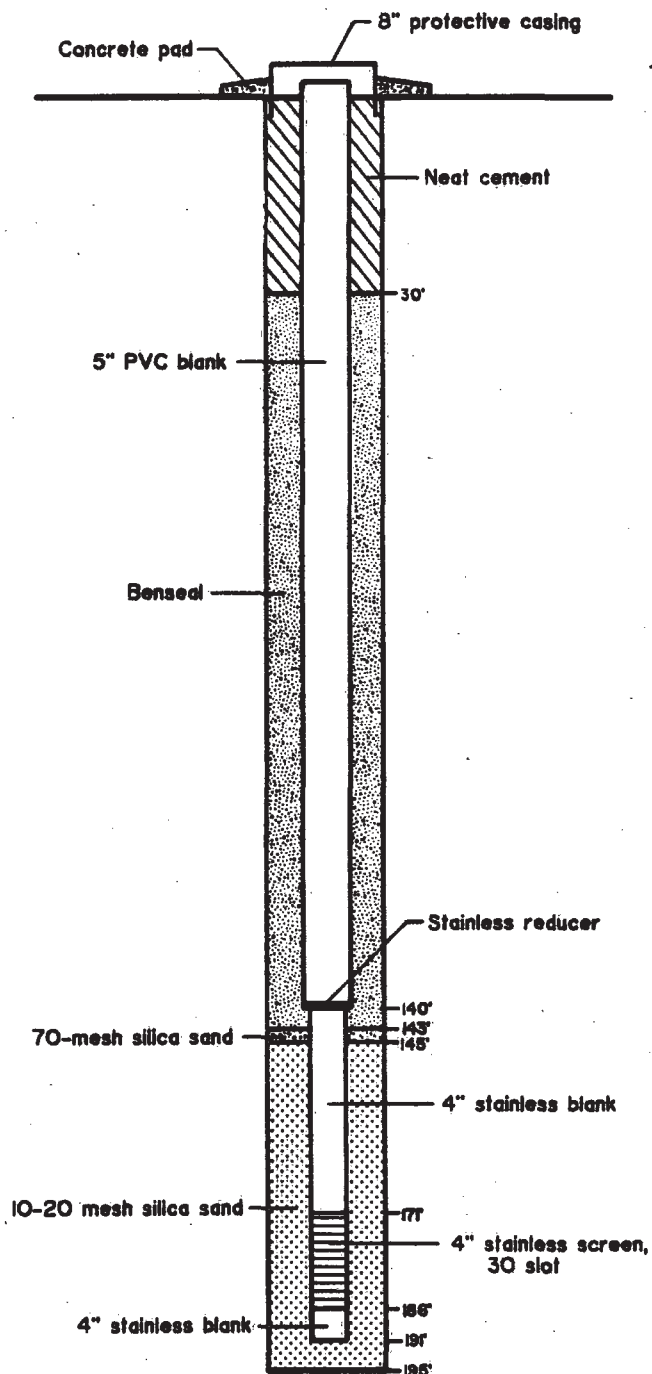
- 0.0'-22.0': Cobbly gravel. 40% gravel, 20% cobbles and boulders, 20% sand, 20% silt with a trace of clay grading with depth to 70% gravel, 20% sand, 10% silt with clay. Gravel is rounded to subangular quartzite, sandstone, siltstone and andesite-latite. Sand is very fine to very coarse grained, rounded to subangular quartz and dark minerals. Carbonate coats on larger clasts. Silty matrix reacts strongly to HCl. Dark grayish brown (2.5Y 4/2), brown (10YR 5/3) with depth.
- 22.0'-26.0': Silty sand. 45% sand, 45% silt, 10% clay. Sand is very fine and very coarse grained, rounded to subangular, quartz and dark minerals. Strong reaction to HCl. Light yellowish brown (10YR 6/4).
- 26.0'-41.0': Sandy silt. 60% silt, 25% sand, 15% gravel, grading with depth to 40% silt, 35% gravel, 15% sand, 10% clay. Sand as above. Gravel is subrounded to subangular quartzite and andesite-latite, many clasts have iron and manganese staining. Strong reaction to HCl. Light yellowish brown (10 YR 6/4).
- 41.0'-60.0': Sandy gravel. 40% gravel, 30% silt, 20% sand, 10% clay, grading with depth to 40% gravel, 30% sand, 20% silt, 10% clay. Gravel is subrounded to subangular quartzite, andesite-latite, sandstone, siltstone and limestone. Sand is very fine to very coarse grained, rounded to subangular quartz and dark minerals. Clayey silt matrix reacts strongly to HCl. Light yellowish brown (10YR 6/4), pale brown (10YR 6/3).
- 60.0'-118.0': Gravelly sand. 50% sand, 20% gravel, 20% silt, 10% clay. Sand is very fine to very coarse grained, rounded to subangular quartz and dark minerals with some vitric ash. Gravel is subrounded to subangular quartzite, sandstone, limestone, andesite-latite and occasional tuff fragments. Clayey silt matrix reacts strongly to HCl. Light yellowish brown (10YR 6/3), brown (10YR 5/3).
- 118.0'-125.0': Silty sandstone. Sand is fine to medium grained, 50% angular vitric ash and 50% rounded quartz. Silt is vitric ash. Strong reaction to HCl. Pale brown (10YR 6/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		Sandy gravel
40		
60		
80		
100		
120		Silty sand
140		Sandy gravel
160		Silty sand
180		Sandy gravel
195		Silty sand
	Tcw	Vitric tuff

TD=195'



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HERCULES
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WELL GW-48

TOP OF CASING ELEV. = 4,729.67
GROUND SURFACE ELEV. = 4,727.60

STRATIGRAPHIC LOG

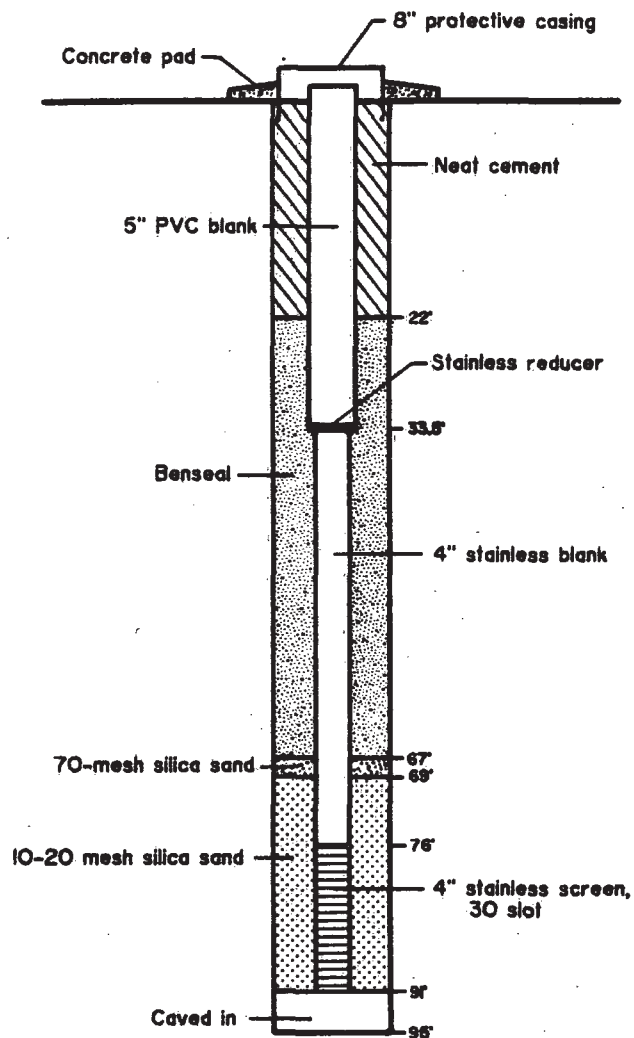
GW-48

- 0.0'-110.0': Sandy gravel. 50% gravel, 25% sand, 20% silt, 5% clay with a few boulders and cobbles. Gravel is subrounded to angular quartzite and sandstone, some siltstone, limestone and andesite-latite. Sand is very fine to very coarse grained. Fine grained sand is rounded to subrounded quartz. Medium to very coarse grained sand is subrounded to subangular quartz and dark minerals. Carbonate coating on many of the larger clasts. Strong to moderate reaction to HCl. Brown (10YR 5/3) to yellowish brown (10YR 6/4).
- 110.0'-114.0': Silty sand. 40% sand, 35% silt, 20% gravel, 5% clay. Sand is very fine to very coarse grained, rounded to subrounded quartz and dark minerals. Gravel is subrounded to subangular quartzite, sandstone and andesite-latite. Sandstone and siltstone are manganese stained. Strong reaction to HCl. Pale brown (10YR 6/3).
- 114.0'-130.0': Sandy gravel same as interval 0.0'-110.0', but pale brown (10YR 6/3).
- 130.0'-135.0': Silty sand. 40% sand, 30% silt, 25% gravel, 5% clay. Same as interval 110.0'-114.0', but contains a few calcareous nodules (medium sand sized) are present.
- 135.0'-179.0': Sandy gravel. Same as interval 0.0'-110.0', but contains a trace of vitric ash tuff. Tuff is manganese-stained. Brown (10YR 5/3), light yellowish brown (10YR 6/4).
- 179.0'-186.0': Silty sand. 40% sand, 30% silt, 25% gravel, 5% clay. Same as interval 110.0'-114.0', but contains some vitric ash tuff. Tuff is manganese stained. Pale brown (10YR 6/3).
- 186.0'-195.0': Vitric tuff; moderately devitrified. Contains occasional medium sand-size calcareous nodules. Strong reaction to HCl. Brownish gray (2.5Y 6/2).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

20	Qh	Gravelly sand
		Gravelly sand
40		Sandy silt
		Silty sand
60		
		Sand
80		Silty sand
		Sand
		Silty sand

TD=95'



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HERCULES

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WELL GW-49

TOP OF CASING ELEV. = 4,798.82
GROUND SURFACE ELEV. = 4,796.67

STRATIGRAPHIC LOG
GW-49

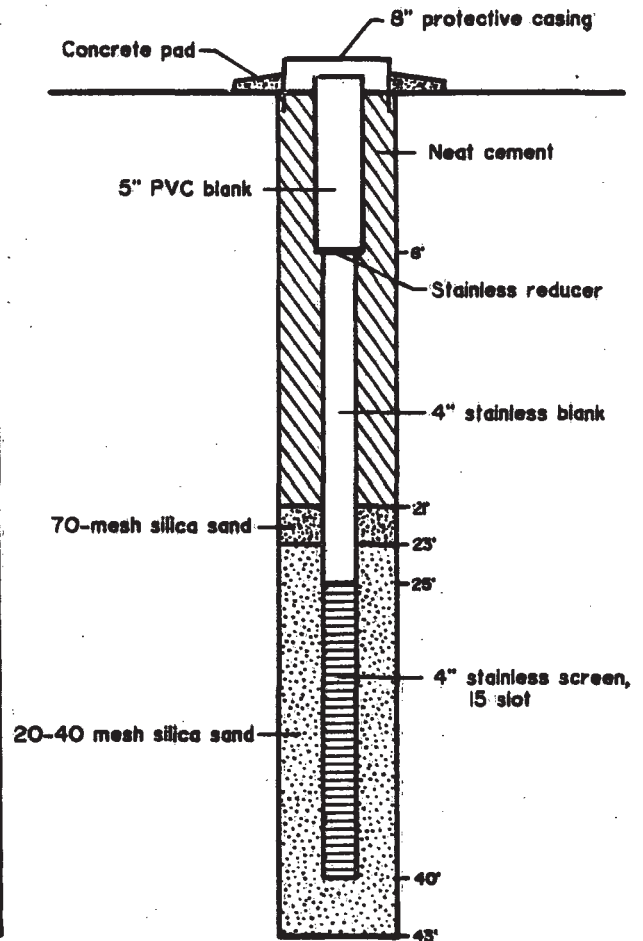
- 0.0'-19.0': Gravelly sand. 40% sand, 30% gravel, 20% silt, 10% cobbles, few boulders. Sand is very fine to very coarse grained (predominantly coarse grained). Sand is rounded quartz and dark minerals. Gravel and cobbles are subangular, subrounded and rounded quartzite and sandstone. Larger clasts are carbonate-coated. Silt matrix reacts strongly to HCl. Light brownish gray (10YR 6/2), brown (10YR 5/3).
- 19.0'-29.0': Gravelly sand as above, but yellowish brown (10YR 5/4).
- 29.0'-43.0': Sandy silt. 45% silt, 25% sand, 20% clay, 10% gravel. Sand is very fine to very coarse grained, rounded, quartz and dark minerals. Gravel is predominantly subrounded to subangular with a few rounded quartzite and sandstone clasts. Larger clasts are carbonate coated. Strong reaction to HCl. Brown (10YR 5/3), yellowish brown (10YR 6/4).
- 43.0'-59.0': Silty sand. 35% sand, 30% silt, 20% gravel, 15% clay. Sand is very fine to very coarse grained, subrounded to subangular, quartz and dark minerals. Gravel is subangular to angular quartzite, sandstone and andesite-latite. Moderate reaction to HCl. Pale brown to light yellowish brown (10YR 6/3 to 6/4).
- 59.0'-69.0': Silty sand. 60% sand, 30% silt, 10% clay. Sand is very fine to medium grained (predominantly very fine grained), rounded to subrounded quartz. Moderate reaction to HCl. Pale brown (10 YR 6/3).
- 69.0'-75.0': Sand. 95% sand, 5% silt. Sand is very fine to coarse grained (mostly fine grained), rounded to subrounded quartz. No reaction to HCl. Light yellowish brown (10YR 6/4).
- 75.0'-86.0': Silty sand. Same as interval 59.0'-69.0', but brown (10YR 5/3).
- 86.0'-90.0': Sand. Same as interval 69.0'-75.0', but dark brown (10YR 3/3).
- 90.0'-95.0': Silty sand. 75% sand, 15% silt and clay, 10% gravel. Sand is very fine to very coarse grained (mostly medium), rounded to subrounded: 50% quartz, 50% dark minerals. Gravel is subrounded to angular, quartzite. Weak reaction to HCl. Brown (10YR 4/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
10		Silty clay
		Sandy silt
		Silty sand
20		Sandy gravel
	Qh	Silty sand
30		
40		Sand

TD=43'



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WELL GW-50

TOP OF CASING ELEV. = 4,792.08
GROUND SURFACE ELEV. = 4,790.48

STRATIGRAPHIC LOG
GW-50

- 0.0'-5.0': Silty clay. 50% clay, 40% silt, 10% sand. Very fine to fine grained subangular ash shards. Clay is altered vitric ash. Strong reaction to HCl. Yellowish brown (10YR 5/4).
- 5.0'-10.0': Sandy silt. 55% silt, 35% sand, 10% clay. Sand is fine grained, rounded quartz and vitric ash. Clay is altered vitric ash. Strong reaction to HCl. Light brownish gray (2.5Y 6/2).
- 10.0'-14.0': Silty sand. 55% sand, 40% silt, 5% clay. Sand is very fine to coarse grained, rounded to subrounded quartz and vitric ash. Silt is vitric ash. Clay is altered vitric ash. Silt and clay are iron stained. Strong reaction to HCl. Light brownish gray (2.5Y 6/2).
- 14.0'-20.0': Sandy gravel. 40% gravel, 30% sand, 20% silt, 10% clay. Gravel is subrounded to subangular, mostly quartzite with some sandstone, siltstone and andesite-latite. Sand is very fine to very coarse grained, rounded to subangular quartz, dark minerals, some vitric ash. Silt is vitric ash. Clay is altered vitric ash. Fines react strongly to HCl. Brown (10YR 5/3).
- 20.0'-29.0': Silty sand. 70% sand, 20% silt, 10% clay. Sand is very fine to very coarse grained, subrounded to subangular quartz, dark minerals and some vitric ash. Silt is vitric ash. Clay is altered vitric ash. Both silt and clay have some iron staining. Strong reaction to HCl. Color grades with depth from pale brown (10YR 6/3) to light brownish gray (2.5Y 6/2).
- 29.0'-43.0': Sand. 95% sand, with minor amounts of gravel and silt. Sand is very fine to coarse grained (predominantly medium to fine grained), rounded to subrounded quartz, dark minerals, and vitric ash. Gravel is subrounded to subangular, mostly quartzite with siltstone, sandstone and andesite-latite. Strong reaction to HCl. Light yellowish brown (2.5Y 6/4).

GEOLOGIC LOG

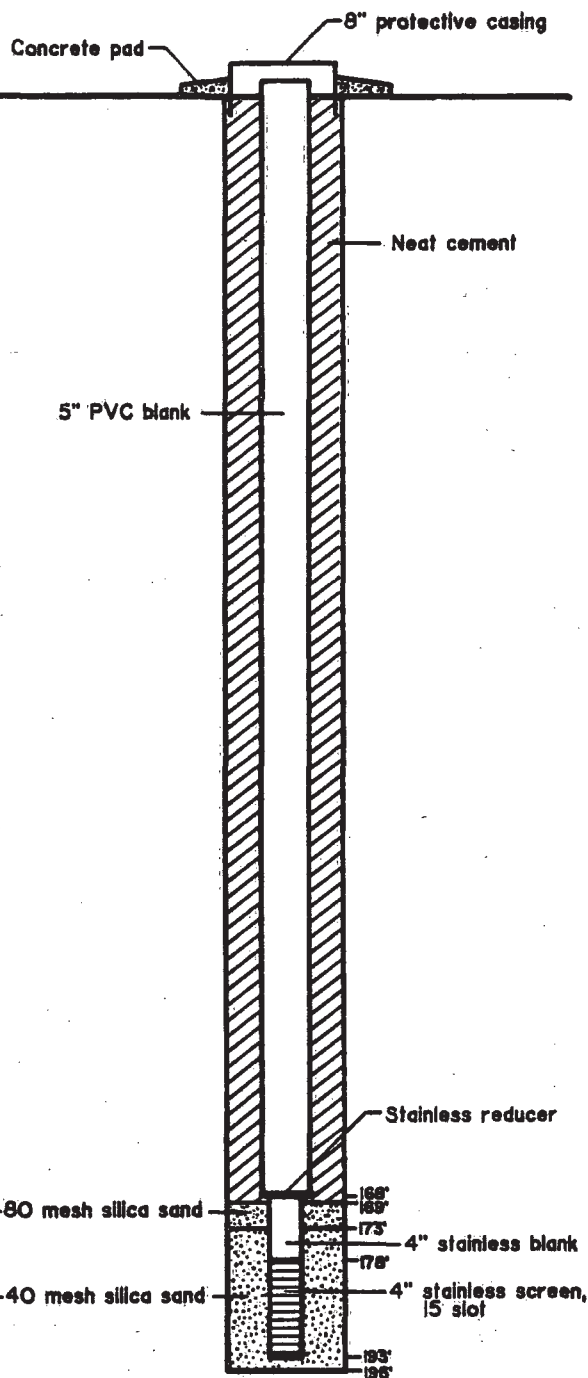
WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		Sandy gravel
		Sandy gravel with clay
40		Sandy gravel
80		Gravel
120		Sandy gravel
140		Sandy gravel with silt
180		Vitric tuff

Qh

Tjn

TD=195'



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HERCULES

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WELL GW-51

TOP OF CASING ELEV. = 4,704.85
GROUND SURFACE ELEV. = 4,702.99

STRATIGRAPHIC LOG

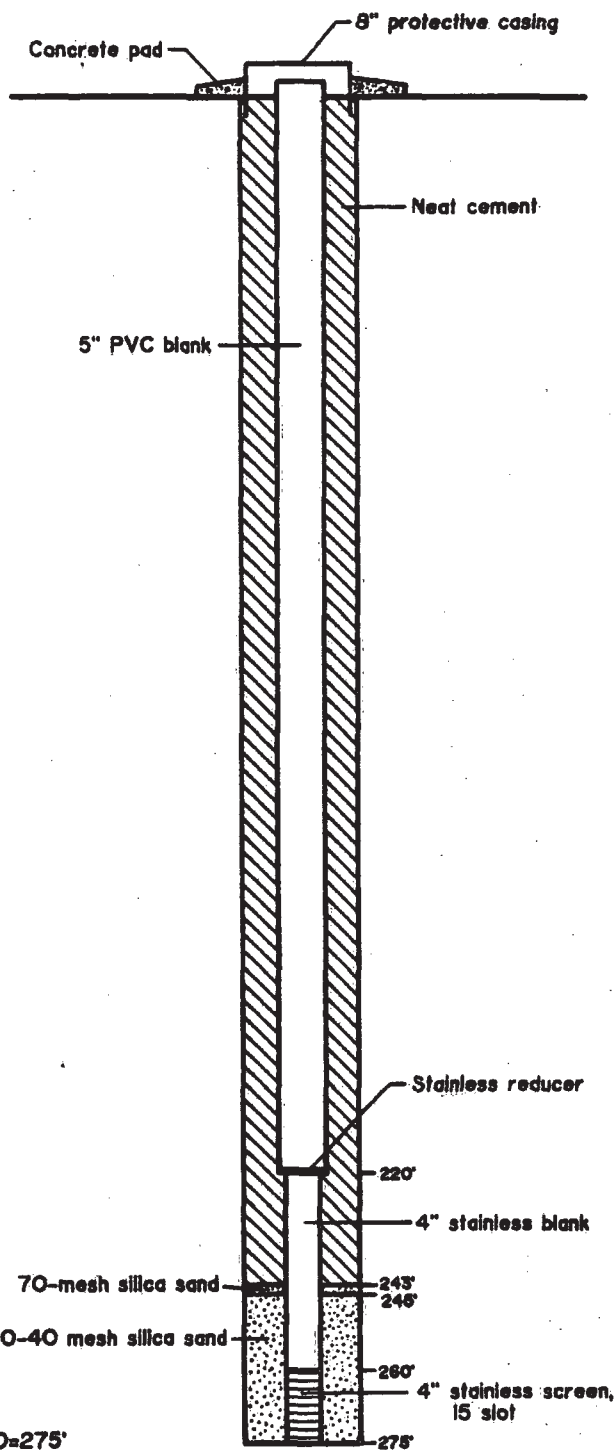
GW-51

- 0.0'-15.0': Sandy gravel. Very dark brown (7.5YR 8/2), brown (10YR 5/3).
- 15.0'-20.0': As above, with 15% clay, 50% gravel, 25% sand. Dark yellowish brown (10YR 4/4).
- 20.0'-65.0': Sandy gravel. 60% gravel, 30% sand, 10% clay. Gravel is 90% quartzite, 10% andesite-latite. Light yellow brown (10YR 6/4), pale brown (10YR 7/4).
- 65.0'-110.0': Gravel, with some silt and clay. 80% quartzite, 5% sandstone, 5% limestone, 5% andesite-latite, 5% chert. Larger fragments have partial carbonate coats.
- 110.0'-130.0': Sandy gravel. Gravel is mostly quartzite, some limestone, andesite-latite and chert.
- 130.0'-163.0': Sandy gravel as above, but contains 15-20% silt.
- 163.0'-195.0': Vitric tuff. Contains up to 10% quartz sand and silt. Smooth, friable. Light olive gray (5Y 6/2).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		Gravel and sand
20		Silty sandstone
40		Conglomerate
60		
80		Sandstone & gravel
100		
120		
140		
160		
180		
200		
220		
240		
260		
275		



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WELL GW-52

TOP OF CASING ELEV. = 4,569.82
GROUND SURFACE ELEV. = 4,567.84

STRATIGRAPHIC LOG
GW-52

- 0.0'-17.0': Gravel and sand. Gravel is 90% very fine to fine grained quartzite (brown, white, pink, purple), 10% carbonate and andesite-latite. Sand is angular to subrounded, quartz. Trace of mica.
- 17.0'-35.0': Silty sandstone. Very fine grained, subrounded to well rounded quartz with 10% mafics. Non-calcareous, poorly lithified. Yellowish brown (10YR 5/6).
- 35.0'-40.0': Conglomerate, with some silty sandstone. Gravel-size clasts dominate, light green to dark gray latite-andesite, 5% quartzite. Sandstone as above.
- 40.0'-45.0': As above, but contains some dark purple andesite and less than 10% sandstone.
- 45.0'-50.0': As above, but 30% sandstone, yellowish brown.
- 50.0'-85.0': As above, but contains 10% white sandstone, trace of white banded calcite cement present as gravel-sized clasts. Trace of quartzite.
- 85.0'-90.0': 50% sandstone as above, 50% andesite-latite gravel, as above.
- 90.0'-105.0': Silty sandstone. Sandstone is very fine grained, similar to interval 17' to 35', but contains 2-5% mafics and 5-10% andesite-latite gravel.
- 105.0'-145.0': As above, but few sandstone fragments, mostly brown silty sand, trace amounts of volcanic sand and gravel, white carbonate, red sandstone.
- 145.0'-155.0': As above, but contains 40% andesite-latite clasts, conglomeratic.
- 155.0'-225.0': As above, with 30% andesite-latite, 10% white carbonate. One gravel-sized clast of lithic arenite with volcanic sand grains and dolomitic cement. Up to 20% white carbonate with depth.
- 225.0'-275.0': Silty sandstone, as above, with 1-5% each of white carbonate, volcanic, and red sandstone clasts.

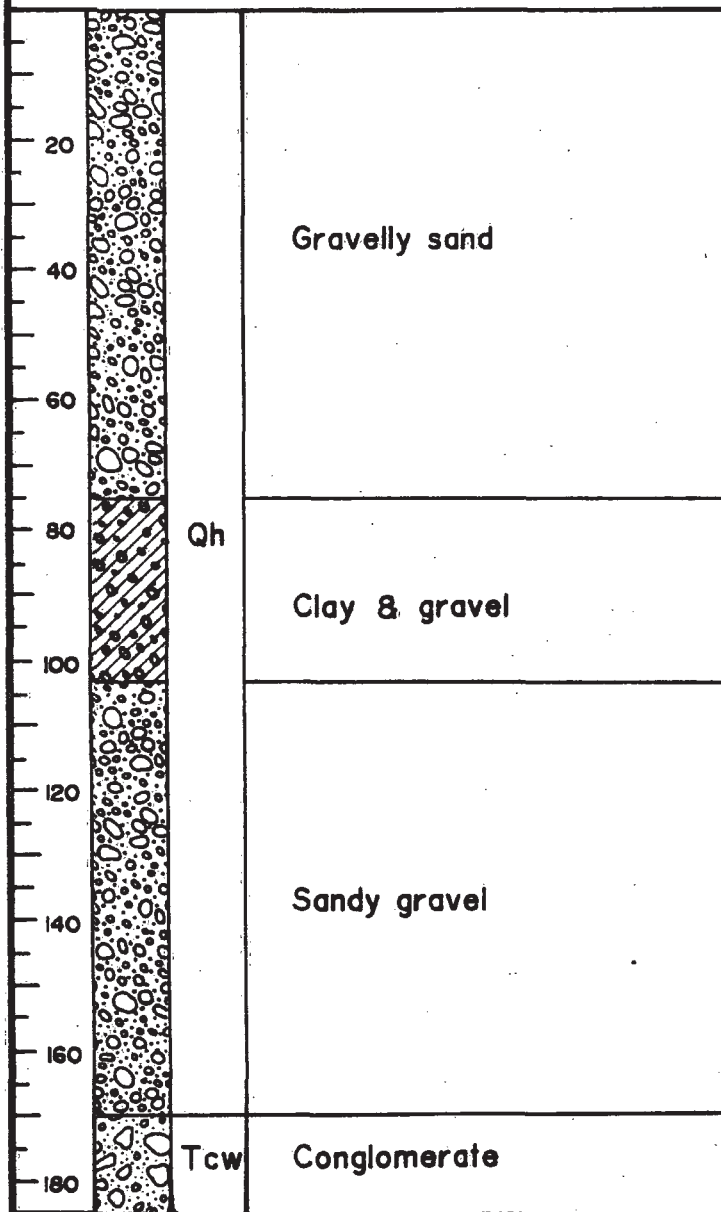
GEOLOGIC LOG

DEPTH (ft)

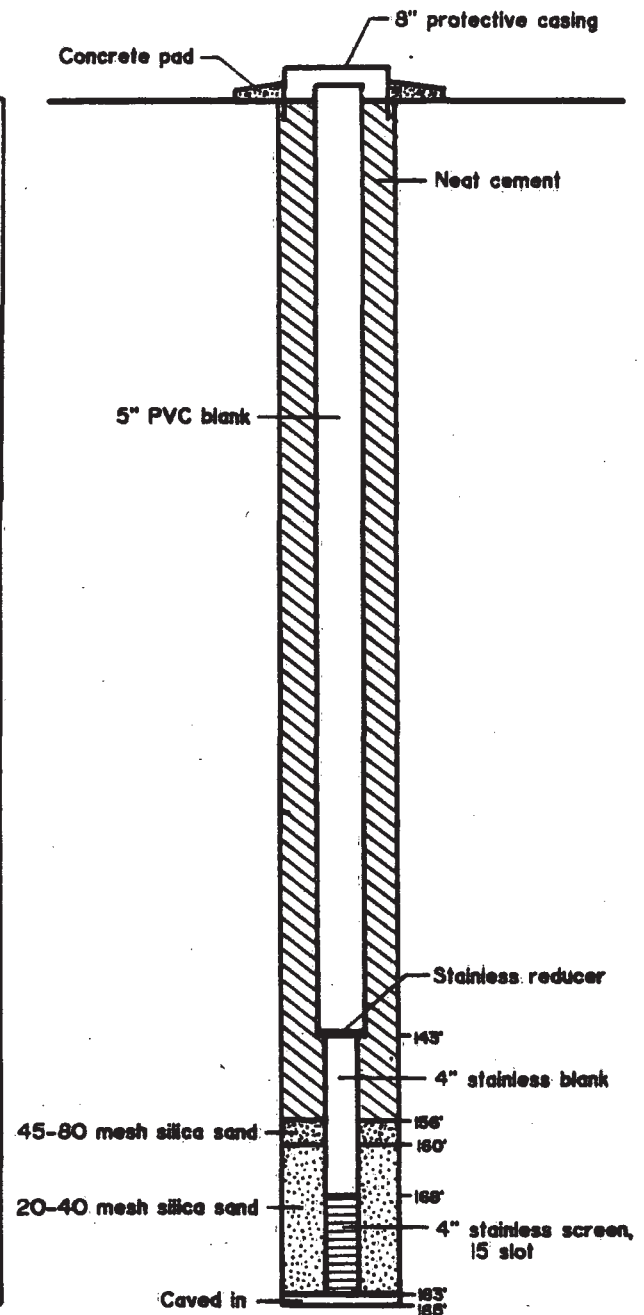
GRAPHIC LOG

DESCRIPTION

WELL CONSTRUCTION DETAILS



TD=185'



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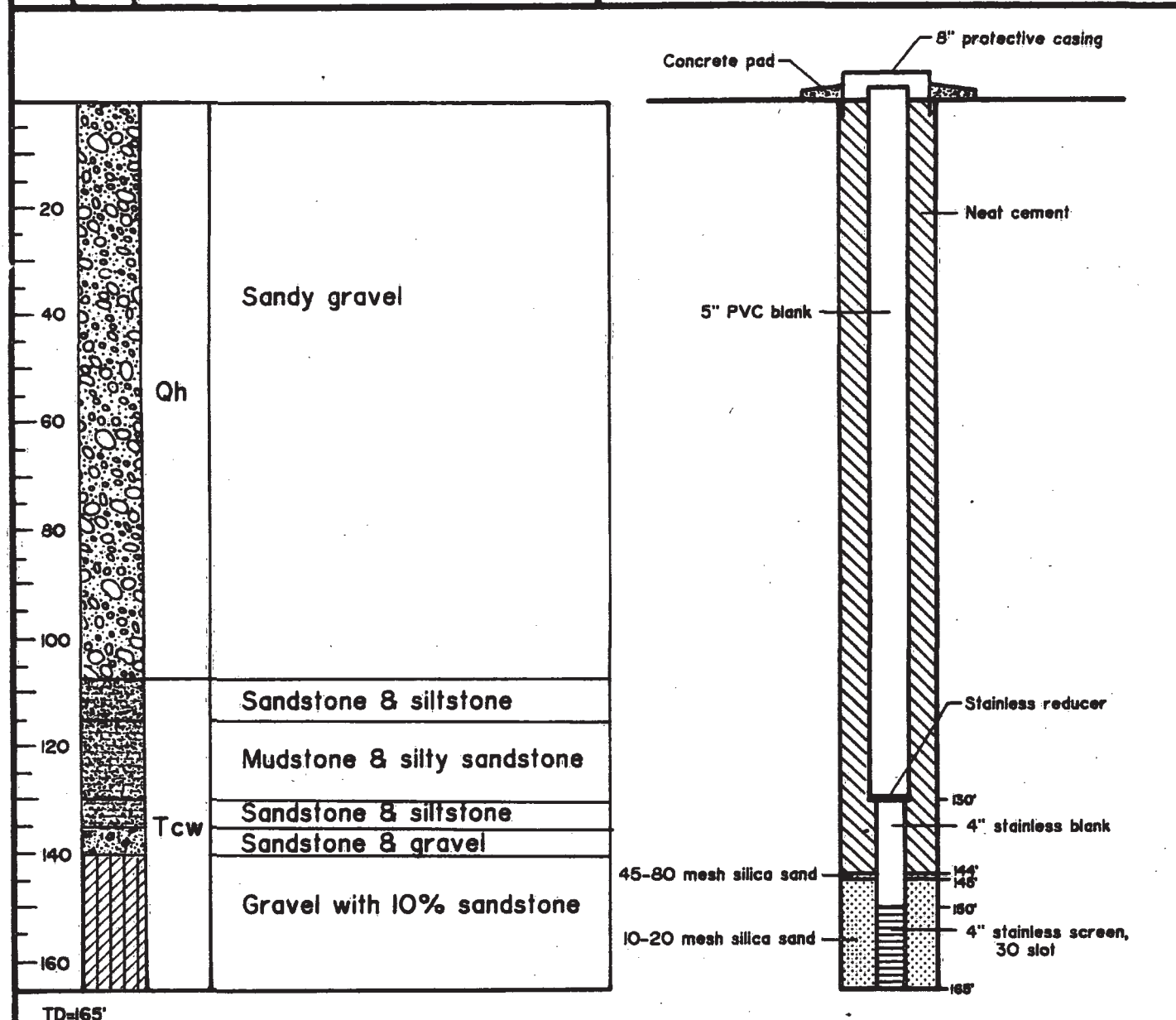
WELL GW-53

TOP OF CASING ELEV. = 4,560.63
GROUND SURFACE ELEV. = 4,559.07

STRATIGRAPHIC LOG
GW-53

- 0.0'-45.0': Gravelly sand. 35% sand, 30% gravel, 20% boulders, 10% silt, 5% clay. Sand is quartz, fine grained. Strong reaction to HCL. Brownish yellow (10YR 5/8).
- 45.0'-75.0': Gravelly sand. Fewer boulders, more gravel than above. Gravel is angular to subangular, quartzite and volcanics. Brownish yellow (10YR 5/8).
- 75.0'-103.0': Clayey gravel. Clay with gravel and cobbles. Gravel is subangular to subrounded. Strong reaction to HCL. Brownish yellow (10YR 6/6).
- 103.0'-169.0': Sandy gravel with silt and clay. Strong reaction to HCL. Brownish yellow (10YR 6/6).
- 169.0'-185.0': Conglomerate. Quartzite and volcanic clasts in sand matrix. Strong reaction to HCL. Yellowish red (5 YR 4/6).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



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WELL GW-54


TOP OF CASING ELEV. = 4,556.82
GROUND SURFACE ELEV. = 4,555.29

STRATIGRAPHIC LOG

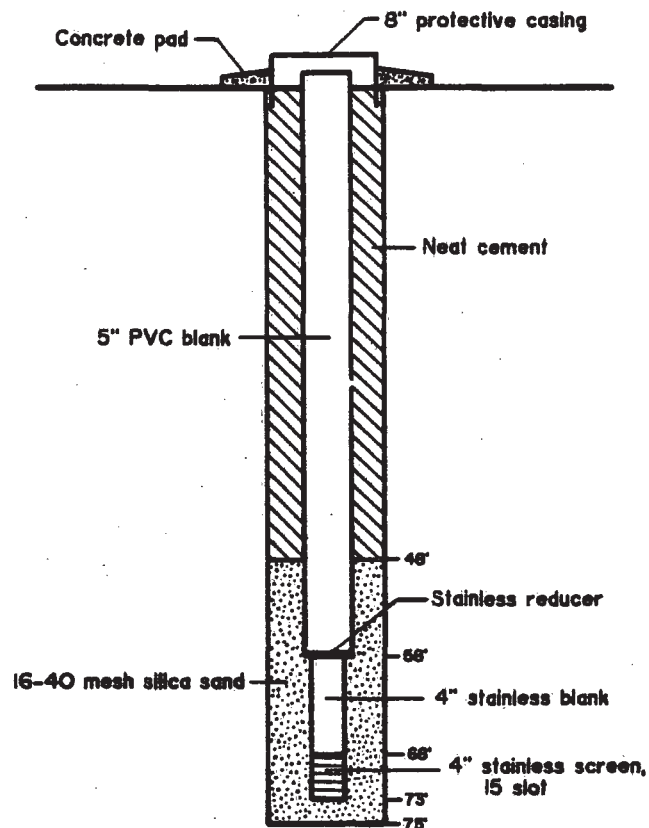
GW-54

- 0.0'-20.0': Sandy gravel. 60% gravel, 40% sand. Numerous quartzite boulders, silty zones. Light brown (7.5YR 6/4).
- 20.0'-45.0': Sandy gravel. 50% gravel, 30% sand, 10% silt, 5% clay. Light brown (7.5YR 6/4).
- 45.0'-60.0': Sandy gravel. 60% gravel, 20% sand, 10% silt, 10% clay, silt and clay are in stringers. Light brown (7.5YR 6/4).
- 60.0'-95.0': Sandy gravel. 60% gravel, 30% sand, 10% silt, boulders. Very pale brown (10YR 7/4).
- 95.0'-107.0': Sandy gravel, some silt. (90% quartzite, 10% carbonate, trace of andesite-latite, minor amounts of silt, clay balls, with suspended sand and gravel.
- 107.0'-115.0': Sandstone and siltstone. Very fine grained sandstone, siltstone are light brown. 15% gravel, mostly quartzite with some andesite-latite.
- 115.0'-130.0': Mudstone and silty sandstone. Mudstone is light brown and reddish brown, contains some sand grains. Sandstone is very fine grained. 5% quartzite gravel.
- 130.0'-135.0': Sandstone and siltstone. 95% very fine grained sandstone, light brown; 5% siltstone, reddish brown. Sandstone and siltstone contain 10% dark minerals. Trace of latite gravel.
- 135.0'-140.0': 50% Sandstone, as above, 50% quartzite gravel. Trace of tuff.
- 140.0'-165.0': 80% Gravel, 10% sandstone as above, 5% andesite-latite, as above, 5% carbonate. Volcanics increase to 20% with depth.

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

20		Sandy gravel
		Clay & gravel
40		Sandy gravel
		Gravelly clay
		Clay & gravel
60		Sandy gravel

TD=75'



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WELL GW-55

TOP OF CASING ELEV. = 4,694.63
GROUND SURFACE ELEV. = 4,693.13

STRATIGRAPHIC LOG

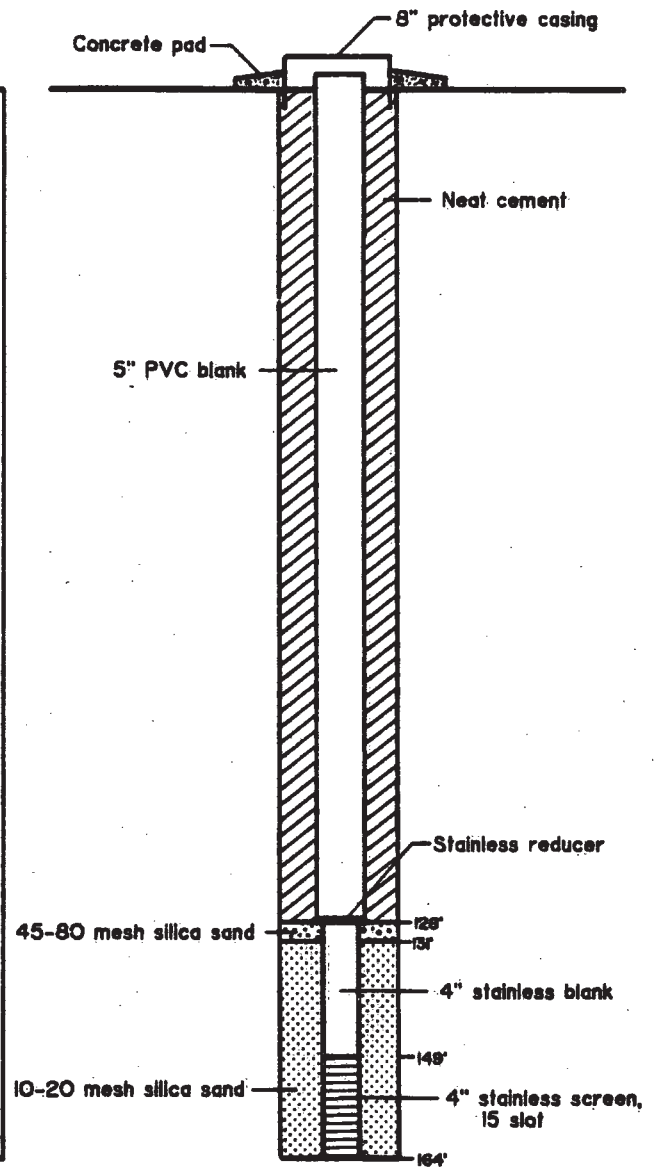
GW-55

- 0.0'-30.0': Sandy gravel. 65% gravel: quartzite with some andesite-latite; 30% sand; 5% silt. Dark brown (10YR 3/3).
- 30.0'-35.0': Clayey gravel. 65% gravel, 20% clay, 15% sand. Pale brown (10YR 6/3).
- 35.0'-45.0': Sandy gravel. 65% gravel, 30% sand, 5% clay. Yellowish brown (10YR 5/6 and 10YR 6/6).
- 45.0'-50.0': Gravelly clay. 55% clay, 30% gravel, 15% silt, plastic, slow dilatancy. Gravels are 70% quartzite, 30% andesite-latite. Very pale brown (10YR 7/6).
- 50.0'-60.0': Clayey gravel. 55% gravel, 45% clay, some cobbles. Pale brown (10YR 6/3) and light yellowish brown (10YR 6/4).
- 60.0'-70.0': Sandy gravel. 70% gravel, 25% sand, 5% silt. Sand is very fine grained. Pale brown (10YR 6/3).
- 70.0'-75.0': Sandy gravel. 50% gravel, 30% sand, 20% silt. Sand is very fine grained. Pale brown (10YR 6/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		Qh Sandy gravel
40		
60		
80		
100		
120		
140		
160		



TD=164'



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WELL GW-56

TOP OF CASING ELEV. = 4,549.24
GROUND SURFACE ELEV. = 4,547.71

STRATIGRAPHIC LOG

GW-56

0.0'-90.0': Sandy gravel. Gravel is 95% quartzite, 5% carbonate and andesite-latite. Matrix is approximately 80% sand, 20% silt and clay. Light yellowish brown (10YR 6/4). Occasional silt and clay stringers.

90.0'-164.0': Sandy gravel, as above, but contains minor amounts of andesite-latite, tuff and sandstone.

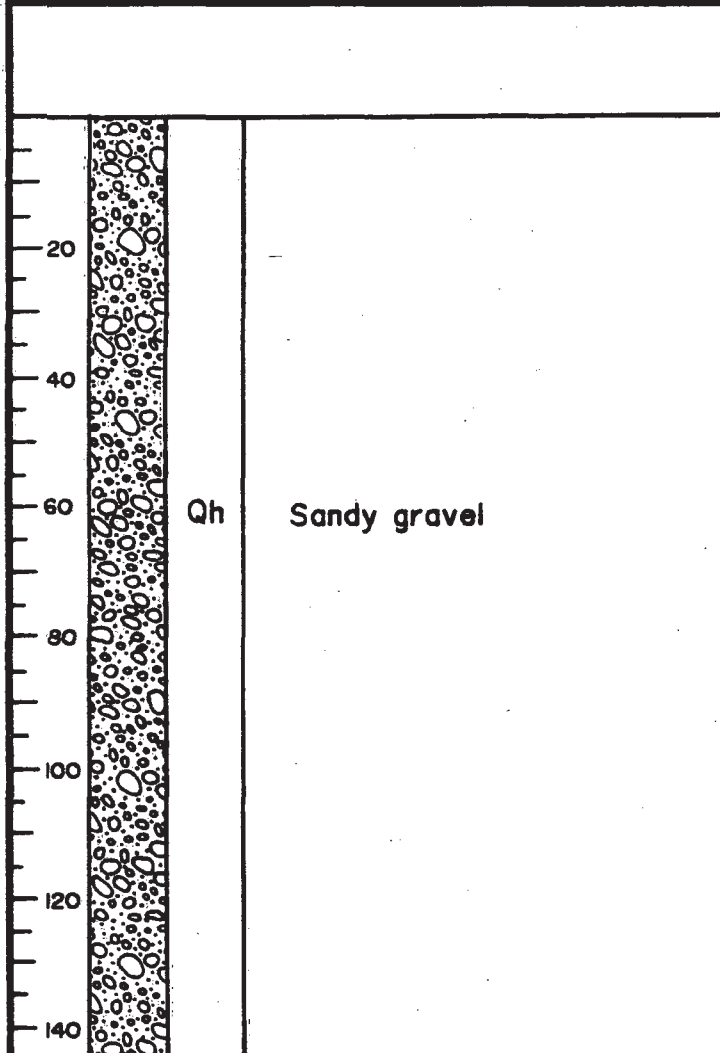
GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	

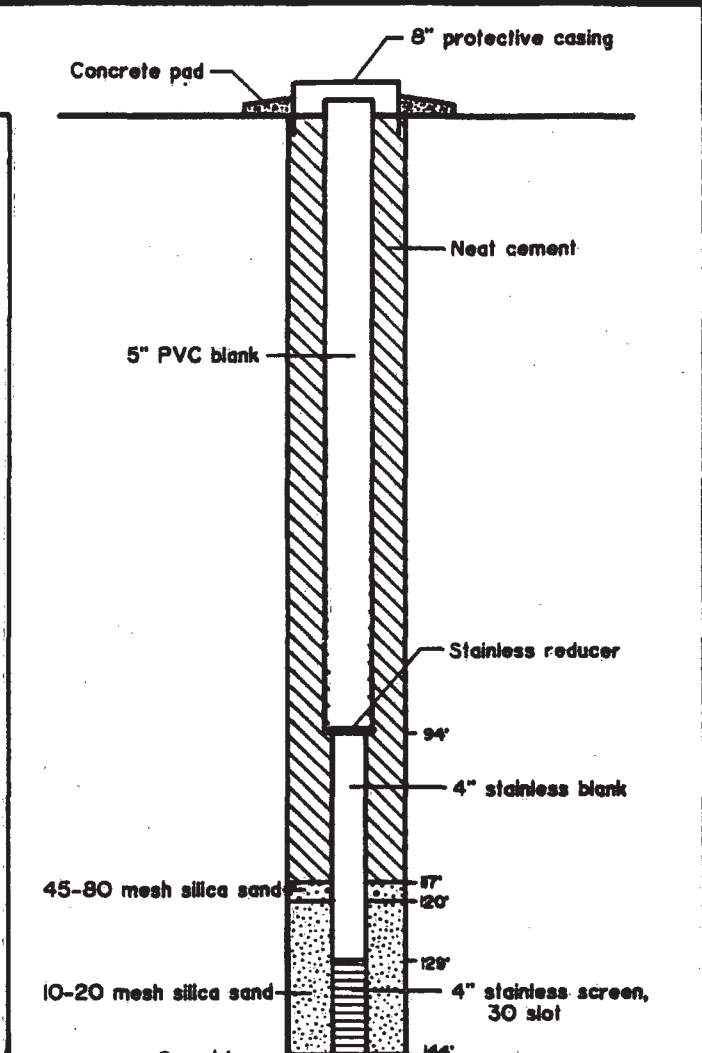
DEPTH (M)

GRAPHIC LOG

DESCRIPTION



TD-145'



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WELL GW-57

TOP OF CASING ELEV. = 4,539.97
GROUND SURFACE ELEV. = 4,538.75

WELL GW-57

TOP OF CASING ELEV. = 4,539.97
GROUND SURFACE ELEV. = 4,538.75

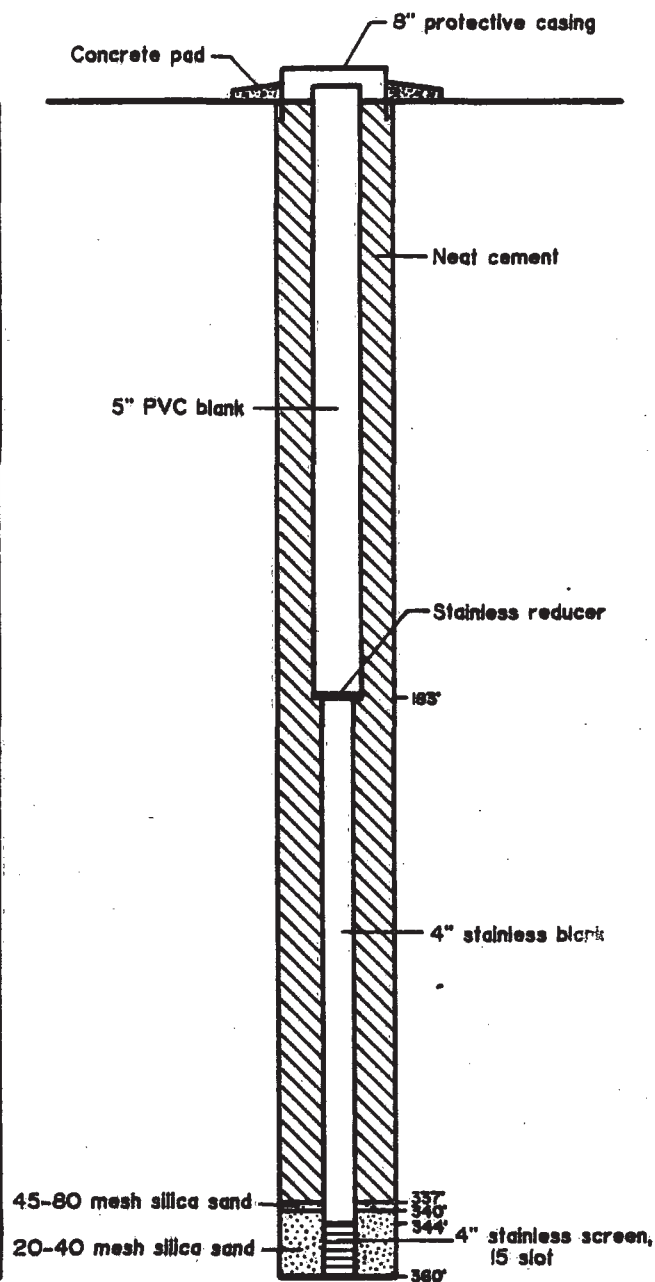
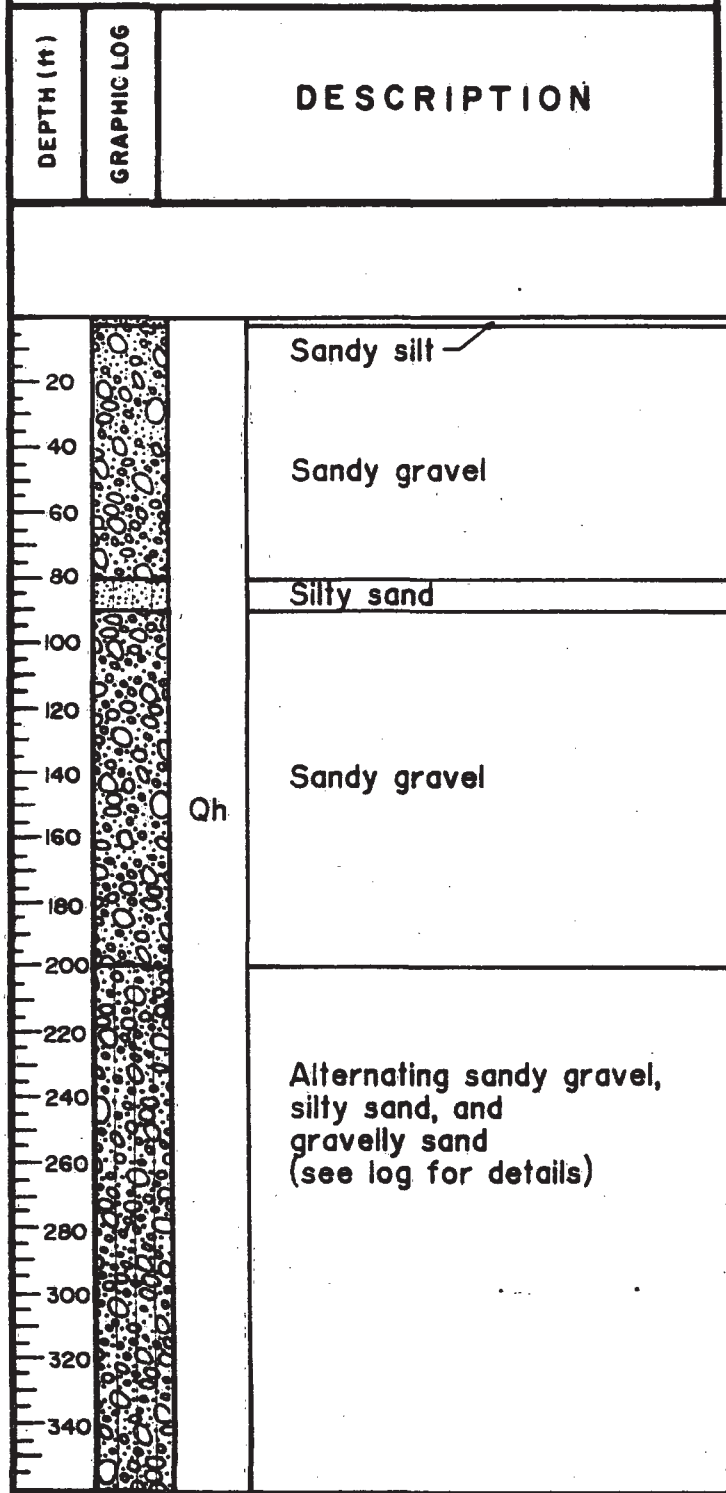
STRATIGRAPHIC LOG

GW-57

- 0.0'-10.0': Sandy gravel. 65% gravel, 35% sand, with stringers of silt and clay, slight to no plasticity. Brown (7.5YR 5/2).
- 10.0'-55.0': Sandy gravel. 60% gravel, 30% sand, 10% silt, trace of clay. Gravels are subangular to subround: 90% quartzite and 10% andesite-latite. Pale brown (10YR 6/3).
- 55.0'-110.0': Sandy gravel. As above, but light yellowish brown (10YR 6/4).
- 110.0-145.0': As above, but 55% gravel, 35% sand, 10% silt.

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



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WELL GW-58

TOP OF CASING ELEV. = 4,969.64
GROUND SURFACE ELEV. = 4,967.79

STRATIGRAPHIC LOG

GW-58

- 0.0'-3.0': Sandy silt. 45% silt, 35% sand, 20% gravel with cobbles and boulders. Sand is very fine to very coarse, rounded to subangular, quartz, with some dark minerals. Gravel is subrounded to subangular, quartzite, sandstone, siltstone, with some dark minerals. Strong reaction to HCL. Earthy odor. Dark grayish brown (10YR 6/3).
- 3.0'-80.0': Sandy gravel. 50% gravel, 30% sand, 15% silt, 5% clay with cobbles and boulders. Gravel is subrounded to angular quartzite, with minor dark minerals, limestone, and sandstone. Sand is very fine to very coarse grained, quartz with dark minerals and occasional tuff fragments. Strong reaction to HCL. Brown (10YR 5/4).
- 80.0'-90.0': Silty sand. 55% sand, 35% silt, 10% clay. Sand is very fine to coarse grained, rounded to subrounded, mostly quartz, with sandstone, limestone, and dark minerals. Gravel is rounded to subangular, quartzite with lesser siltstone, sandstone, with dark minerals. Sand and gravel are carbonate-coated with some iron staining. Strong reaction to HCL. Strong brown (7.5YR 5/6) to yellowish brown (10YR 5/4).
- 90.0'-200.0': Sandy gravel. 50% gravel, 30% sand, 15% silt, 5% clay, with a few cobbles and boulders. Gravel is subrounded to angular, quartzite with lesser dark igneous minerals, siltstone, dolomite, and tuff fragments. Sand is very fine to very coarse grained, rounded to subangular. A fine grained sand lens is present from 115.0' to 117.0'. Cobbles and boulders are distributed throughout interval. Matrix reacts strongly to HCL. Light yellowish brown (10YR 5/4).
- 200.0'-209.0': Silty sand. 60% sand, 20% silt, 15% gravel, 5% clay. Sand is very fine to coarse grained, rounded to subrounded, mostly quartz and quartzite, with dark minerals. Some rounded shards of vitric ash in the sand. Gravel is rounded to subangular, calcareous sandstone fragments, with lesser quartzite, limestone. Silt contains some vitric ash. Tuff fragments display laminated bedding. Strong reaction to HCL. Light yellowish brown (10YR 6/4).
- 209.0'-219.0': Sandy silt to silty sand. 50% silt, 40% sand, 5% clay, 5% gravel. Grades to 50% sand, 40% silt, 5% gravel, 5% clay. Silt contains a very minor

amount of vitric ash. Sand is very fine to very coarse, rounded to subrounded, quartzite, dark igneous minerals with rounded shards of vitric ash. Gravel subangular, medium grained calcareous sandstone fragments with a silt sized matrix. Matrix reacts strongly to HCL. Yellowish brown (10YR 5/6 to 10YR 6/4).

219.0'-225.0': Sandy gravel. 40% gravel, 35% sand, 20% silt, 5% clay. Gravel is subrounded to angular fragments of quartzite and tuff. Sand is very fine to very coarse grained, rounded to subangular, with quartzite, and lesser amounts of siltstone and dark minerals and tuff fragments. Strong reaction to HCL. Pale brown (10YR 6/3).

225.0'-230.0': Silty sand. 50% sand, 40% silt, 5% gravel, 5% clay. Sand has occasional rounded shards of vitric ash. Silt contains some vitric ash. Strong reaction to HCL. Light yellowish brown (10YR 6/4).

230.0'-234.0': Sandy gravel. 55% gravel, 35% sand, 5% silt, 5% clay. Gravel is subrounded to angular, mostly quartzite. Sand is very fine to very coarse grained, mostly quartz and quartzite. Silt contains vitric ash. Matrix reacts strongly to HCL. Pale brown (10YR 6/3).

234.0'-240.0': Silty sand. 50% sand, 40% silt, 5% gravel, 5% clay. Sand is medium to very fine grained. A few rounded shards of vitric ash are present. Tuff is manganese stained. Strong reaction to HCL. Pale brown (10YR 6/3).

240.0'-265.0': Sandy gravel. 45% gravel, 40% sand, 10% silt, 5% clay. Gravel is rounded to subangular. Sand is medium to very fine grained, rounded to subrounded. Sand contains 30% vitric ash shards. Strong reaction to HCL. Pale brown (10YR 6/3).

265.0'-275.0': Gravelly sand. 50% sand, 35% gravel, 10% silt, 5% clay. Sand is medium to very fine grained, rounded to subrounded. Gravel is rounded to subangular, quartzite with tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

275.0'-279.0': Sandy gravel. 45% gravel, 40% sand, 10% silt, 5% clay. Gravel is subrounded to subangular, quartzite with tuff. Sand is coarse grained, rounded to subangular, mostly quartzite with tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

279.0'-285.0': Gravelly sand. 60% sand, 35% gravel, 5% silt and clay. Sand is very coarse grained, rounded to subangular, quartz with tuff. Gravel is subrounded to subangular, quartzite with dark igneous minerals. Strong reaction to HCL. Pale brown (10YR 6/3).

285.0'-300.0': Gravelly sand. 65% sand, 20% gravel, 10% silt, 5% clay. Sand is very fine to very coarse grained quartz, quartzite, and tuff. Gravel is subrounded to subangular, quartzite with dark igneous minerals, and tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

300.0'-314.0': Sandy gravel. 50% gravel, 40% sand, 5% silt, 5% clay. Gravel is subrounded to subangular, quartzite with dark igneous material and tuff. Sand is very coarse grained, rounded to subangular, mostly quartzite, dark igneous material and tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

314.0'-320.0': Silty sand. 65% sand, 20% silt, 10% gravel, 5% clay. Sand is medium to coarse grained, rounded to subangular, quartz, dark igneous material and tuff. Gravel is subrounded to subangular, mostly quartzite, dark igneous material and tuff. Tuff fragments are manganese stained. Strong reaction to HCL. Pale brown (10YR 6/3).

320.0'-338.0': Sandy gravel. 45% gravel, 40% sand, 10% silt, 5% clay. Gravel is subrounded to subangular, quartzite, dark igneous material and tuff. Sand is very coarse grained, rounded to subangular, mostly quartz, quartzite, dark igneous, with tuff fragments. Strong reaction to HCL. Pale brown (10YR 6/3).

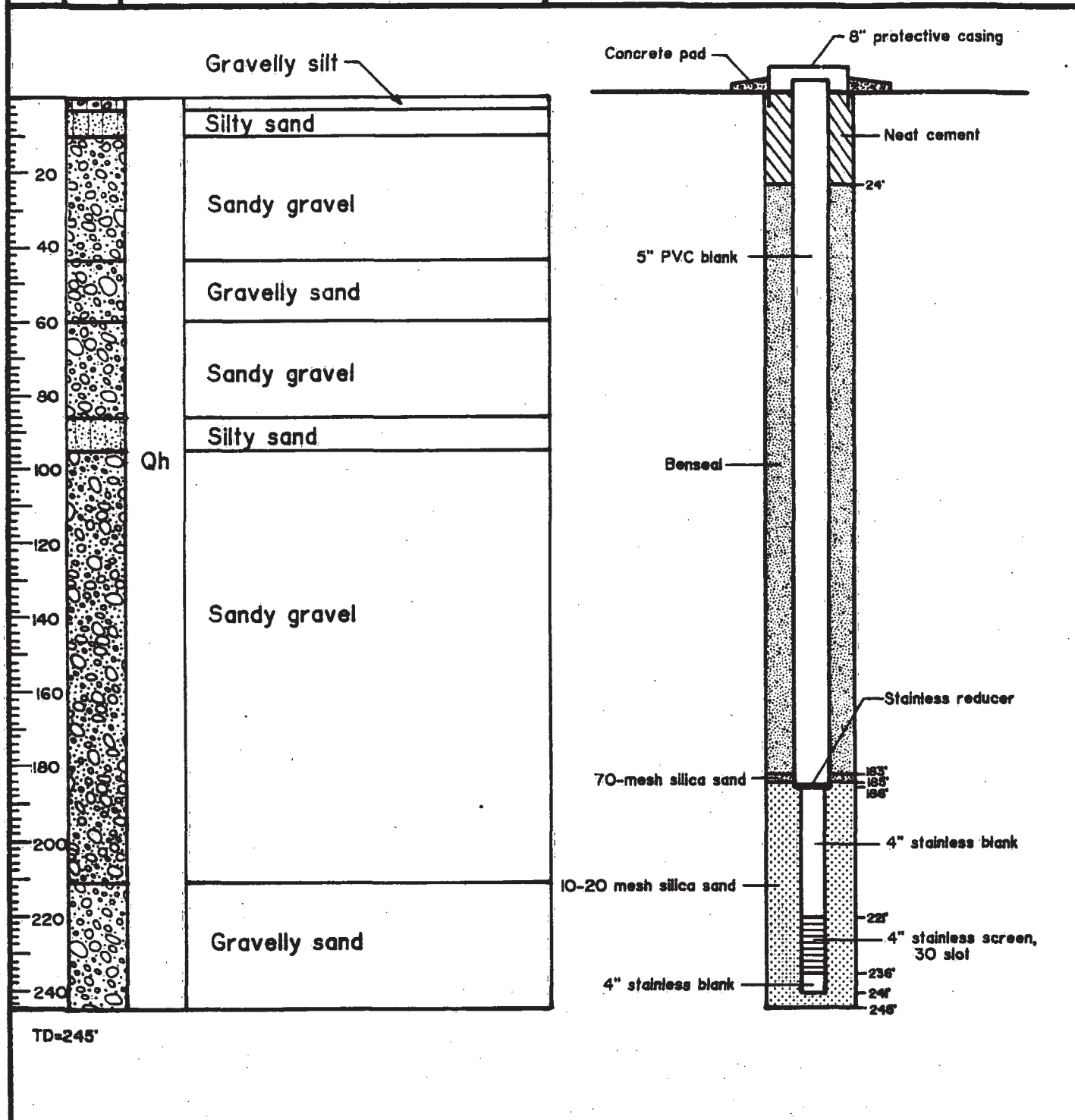
325.0'-329.0': Gravelly sand. 50% sand, 35% gravel, 10% silt, 5% clay. Sand is coarse to very coarse grained, rounded to subangular, quartz, quartzite, with dark igneous minerals and tuff. Gravel is subrounded to subangular, quartzite, dark igneous and tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

329.0'-338.0': Sandy gravel. 50% gravel, 35% sand, 10% silt, 5% clay. Gravel is subrounded to subangular, quartzite, dark igneous, and tuff fragments. Sand is very coarse grained, quartz, quartzite, dark

igneous minerals, and tuff. Strong reaction to HCL. Pale brown (10YR 6/3).

338.0'-360.0': Silty sand. 60% sand, 30% silt, 10% clay, <5% gravel. Sand is medium to very-fine grained, quartz and/or rounded shards of vitric ash, with tuff fragments, and a few white calcareous nodules. Gravel is subangular to subrounded, quartzite, dark igneous, with tuff fragments. Strong reaction to HCL. Color varies from pale brown (10YR 6/3) to light yellowish brown (10YR 5/4).

GEOLOGIC LOG			WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	DESCRIPTION	



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PROJECT No. C-20



HERCULES

**BACCHUS
WORKS**

WELL GW-59

TOP OF CASING ELEV. = 4,907.08
GROUND SURFACE ELEV. = 4,905.07

STRATIGRAPHIC LOG

GW-59

- 0.0'-3.0': Gravelly silt. 40% silt, 30% gravel, 20% sand, 10% clay. Gravel is subrounded to subangular, mostly quartzite, with some andesite-latite, siltstone, sandstone and limestone. Sand is very fine to very coarse grained, rounded to subangular quartz, with minor dark minerals. Larger clasts have carbonate coatings. Strong reaction to HCl. Very dark gray (10YR 3/1).
- 3.0'-10.0': Silty sand. 35% sand, 30% silt, 30% gravel, 5% clay. Sand and gravel as above. Carbonate coatings on larger clasts are thinner than those above. Some sand and gravel particles are iron stained. Strong reaction to HCl. Very dark gray (10YR 3/1).
- 10.0'-44.0': Sandy gravel. 60% gravel, 30% sand, 10% silt, <5% clay grading with depth to 45% gravel, 35% sand, 15% silt, 5% clay. Gravel is subrounded to subangular, quartzite and andesite-latite with some siltstone, sandstone and limestone. Sand is very fine to very coarse grained, rounded to subangular quartz, with some dark minerals and mica. Sandstone and siltstone have minor manganese staining. Strong reaction to HCl. Brown (7.5YR 5/4).
- 44.0'-60.0': Gravelly sand. 55% sand, 25% gravel, 15% silt, 5% clay. Sand is very fine to very coarse grained (predominantly very coarse grained), rounded to subangular, quartz and dark minerals. Gravel is rounded to subangular quartzite, andesite-latite, limestone and some siltstone and sandstone. Sandstone and siltstone fragments have minor manganese staining. Strong reaction to HCl. Brown (7.5YR 5/4).
- 60.0'-86.0': Sandy gravel. 50% gravel, 30% sand, 15% silt, 5% clay. Same as interval 44.0'-60.0', but color is yellowish brown (10YR 6/4).
- 86.0'-95.0': Silty sand. 55% sand, 30% silt, 10% gravel, 5% clay grading with depth to 45% sand, 30% gravel, 20% silt, 5% clay. Sand is very fine to very coarse grained (predominantly medium to fine grained), rounded to subrounded, quartz with dark minerals and vitric ash. Gravel is subrounded to subangular, quartzite and andesite-latite, with some siltstone and sandstone. Strong reaction to HCl. Brown (7.5YR 5/4).

95.0'-211.0': Sandy gravel. 60% gravel, 30% sand, 10% silt, 5% clay, occasional cobbles and boulders. Gravel is subrounded to subangular quartzite and andesite-latite, with some siltstone and sandstone. Sand is very fine to very coarse grained, rounded to subrounded, mostly quartz with some dark minerals and vitric ash, mica, and calcareous nodules (approximately 0.04" diameter). Matrix reacts strongly to HCl. Yellowish brown (10YR 6/4) to brownish yellow (10YR 6/6).

211.0'-245.0': Gravelly sand. 60% sand, 25% gravel, 10% silt, 5% clay. Sand is very fine to very coarse grained, rounded to subangular quartz with dark minerals, mica and vitric ash. Gravel as above, but sandstone is medium grained, poorly indurated, soft. Occasional carbonate nodules (approximately 0.04" diameter). Clayey silt matrix reacts strongly to HCl. Yellowish brown (10YR 6/4).

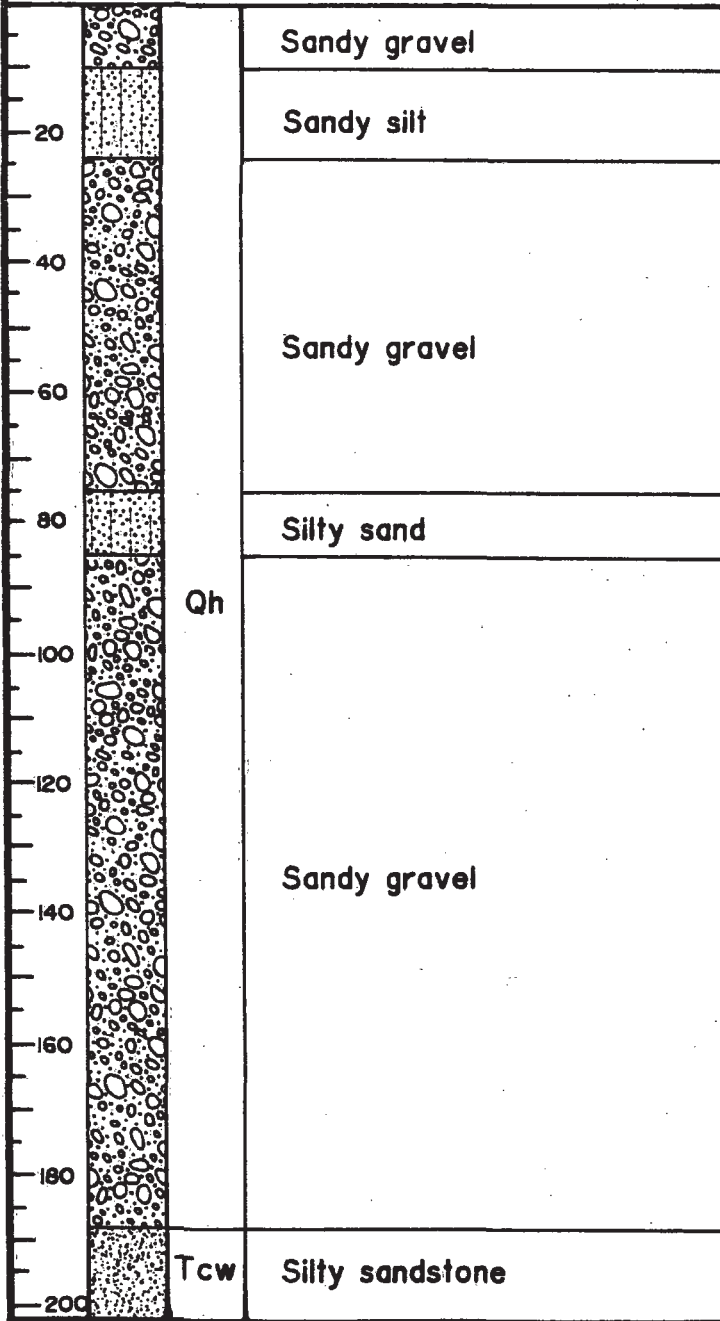
GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

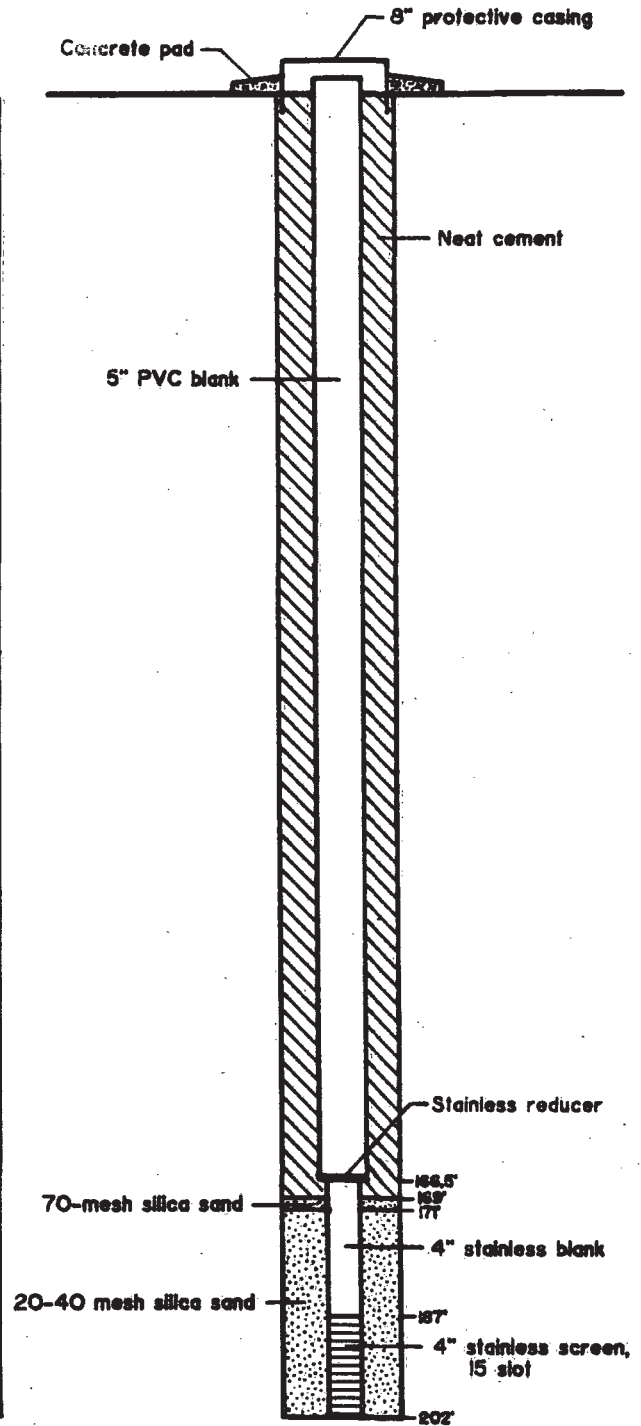
DEPTH (ft)

GRAPHIC LOG

DESCRIPTION



TD=202'



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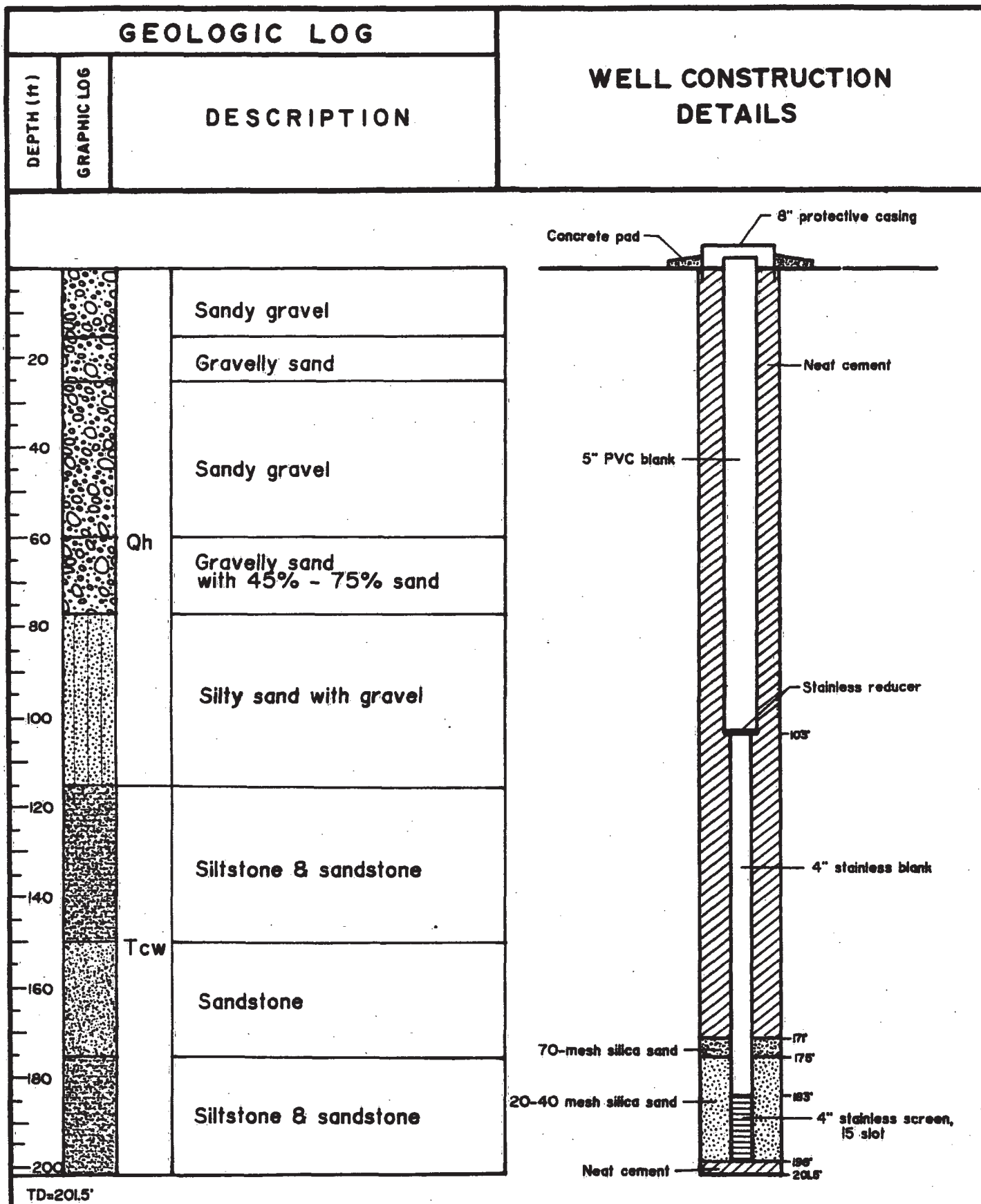
WELL GW-60

TOP OF CASING ELEV. = 4,860.97
GROUND SURFACE ELEV. = 4,857.87

STRATIGRAPHIC LOG

GW-60

- 0.0'-10.0': Sandy gravel. 65% gravel, 20% sand, 15% silt with trace of clay. Gravel is subrounded to angular, quartzite, sandstone, carbonates, volcanics. Moderate reaction to HCL. Boulders from 2' to 7'. Dark brown (10YR 3/3).
- 10.0'-24.0': Sandy silt. 45% silt, 30% sand, 20% gravel, 5% clay. Gravel is angular to subangular. Sands are quartzite, carbonate, volcanics, chert. Mostly fine grained. Clay present as balls. Moderate reaction to HCL. Yellowish brown (10YR 5/5).
- 24.0'-75.0': Sandy gravel. 65% gravel, 20% sand, 15% silt. Gravel is angular to subangular, quartzite, carbonate, volcanics. Sand is subangular to subrounded, fine grained, quartz. Moderate reaction to HCL. Pale brown (10YR 6/3).
- 75.0'-85.0': Silty sand.
- 85.0'-188.0': Sandy gravel. Volcanics make up a large percentage of gravels.
- 188.0'-202.0': Silty sandstone with a trace of gravel. Gravels contain carbonate clasts, volcanics with phenocrysts, siltstone. Reddish color.



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WELL GW-61

TOP OF CASING ELEV. = 4,884.29
GROUND SURFACE ELEV. = 4,881.79

STRATIGRAPHIC LOG

GW-61

- 0.0'-15.0': Sandy gravel. 50% gravel, 30% sand, 15% silt, and 5% clay. Gravel is subangular to subrounded, mostly 1/4 -1" clasts: 40% quartzite (white and tan), 30% andesite-latite, and 30% siltstone, sandstone, and limestone. Silt and clay react strongly to HCl. Yellowish brown (10YR 5/4) and pale brown (10YR 6/3).
- 15.0'-25.0': Gravelly sand. 45% sand, 40% gravel, 15% silt, minor clay. Gravel as above. Fines are terrigenous with minor amounts of vitric ash. Fines react strongly to HCl. Pale brown (10YR 6/3) and light yellowish brown (10YR 6/4).
- 25.0'-60.0': Sandy gravel. 60% gravel, 30% sand, and 10% silt. Gravel is mostly quartzite, with andesite-latite, siltstone, and carbonate. Boulders present at 37 to 41', and 46'. Sand is mostly quartz, with carbonate and vitric ash. Fines react strongly to HCl. Pale brown (10YR 6/3), light yellowish brown (10YR 6/4), and brown (10YR 5/3).
- 60.0'-70.0': Gravelly sand. 45% sand, 40% gravel, and 15% silt, same as interval 15.0' to 25.0', but brown (10YR 5/3).
- 70.0'-77.0': Gravelly sand. Same as above, but approximately 75% sand, 20% gravel, and 5% silt. Carbonate coats on larger clasts. Fines react moderately to HCl. Brown (10YR 5/3).
- 77.0'-80.0': Sandy silt. 40% silt, 30% sand, 20% gravel, and 10% clay. Sand is angular to subrounded, mostly fine to medium grained quartz and dark minerals. Gravel is subangular to subrounded, mostly quartzite and limestone with minor amounts of sandstone. Clay fraction is altered vitric ash and forms clay balls in the bailed sample. Pale brown (10YR 6/3).
- 80.0'-115.0': Silty sand. 75% sand, 15% silt, 7% gravel, and 3% clay. Sand is subangular to subrounded, primarily very fine to fine grained: 30% quartz and quartzite, 40% siltstone and sandstone, 15% tuff, and 15% dark minerals and carbonate, and a minor amount of medium to coarse grained sand which consists of lithic sandstone and tuffaceous siltstone. Gravel is subangular to subrounded: 50% lithic sandstone, 30% sandy tuff, 10% tuffaceous siltstone, and 10% quartzite and limestone. Sandstone fragments are a poorly to moderately

lithified volcanic lithic arenite. Clay balls are present in samples bailed from 77-85' and 105-110'. Fines react moderately to HCl. Pale to very pale brown (10YR 6/3-7/3), yellowish brown (10YR 5/4-6/4).

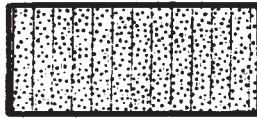
115.0'-150.0': Siltstone and sandstone. 70% sand, 20% silt, 5% gravel, and 5% clay. Gravel is light gray (2.5Y 7/2) weathered silty sandy tuff. Clay is present as clay balls and consists of weathered vitric ash. Interval probably consists of interbeds of altered vitric tuff and volcanic lithic arenite. Very pale brown (10YR 7/3-6/3).

150.0'-175.0': Sandstone. 90% sand, 7% silt, and 3% gravel. Sand is subangular to subrounded, primarily very fine to fine sand: 50% quartzite and quartz, 30% vitric ash, and 20% dark minerals; and medium to coarse sand which consists of reddish brown sandstone and siltstone, and white sandy tuff. Gravel is angular to subangular, reddish brown to brown sandstone and siltstone. Silt fraction contains quartz and vitric ash. Very pale brown (10YR 7/3) to light gray (10YR 7/2).

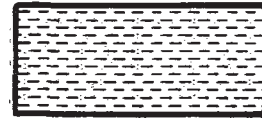
175.0'-201.5': Siltstone and sandstone. As above, but approximately 85% sand, 10% silt, and 5% gravel. Gravel is subangular to subrounded white vitric tuff (partially altered) and reddish brown very fine grained lithic sandstone and siltstone. The lower 6.5' of the interval contains a greater amount of siltstone than the upper 10'. Pale brown (10YR 6/3), light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6).



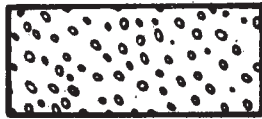
Conglomerate



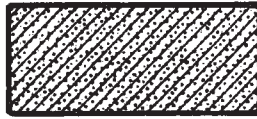
Silty sand



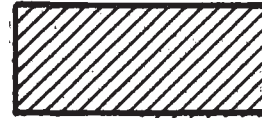
Siltstone / Claystone



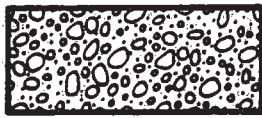
Gravel



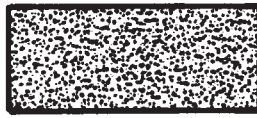
Clayey sand



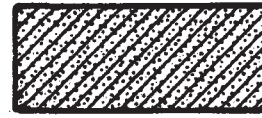
Clay



Sand & gravel



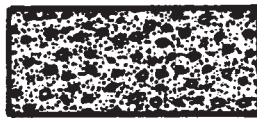
Sandstone



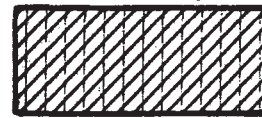
Sandy clay



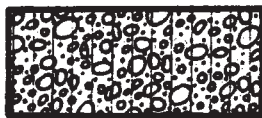
Sandy gravel with clay



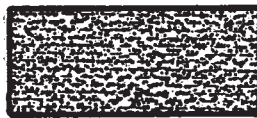
Sandstone & gravel



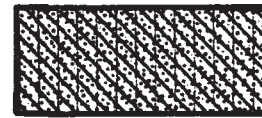
Silty clay



Sandy gravel with silt



Sandstone & all
mud matrix



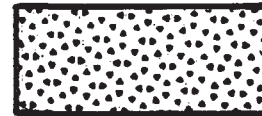
Sandy silty clay



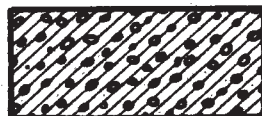
Silty gravel



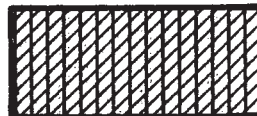
Silt



Tuff



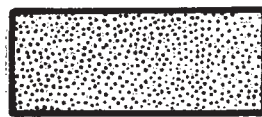
Clay & gravel



Clayey silt



Limestone



Sand



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WORKS

GEOLOGIC SYMBOLS

PREPARED BY
EarthFax Engineering Inc.

DATE
11/88

Hercules Aerospace Company
Bacchus Works

Groundwater Quality Assessment
November 15, 1988

APPENDIX B

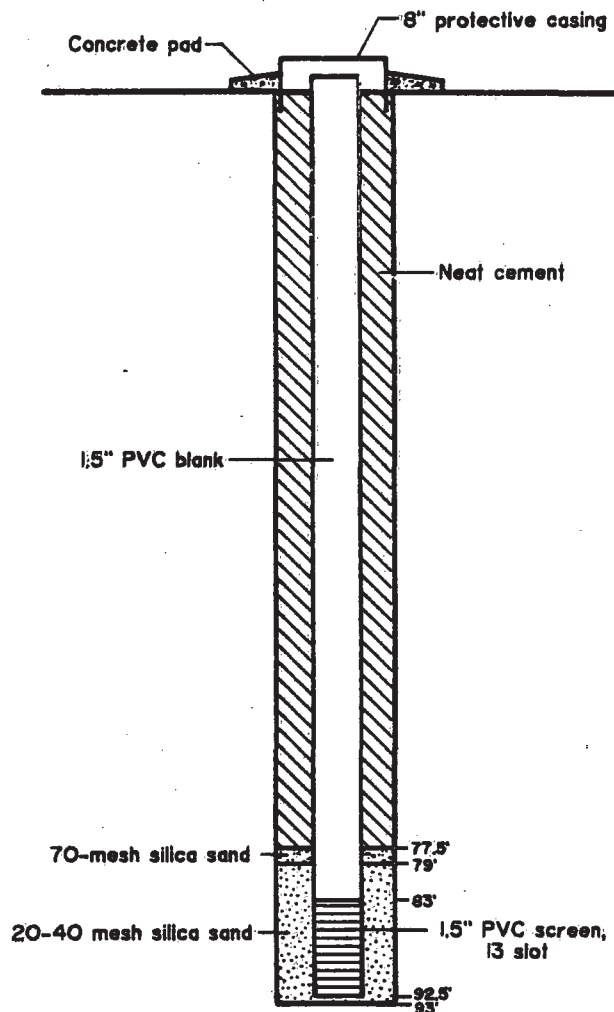
COMPLETION AND LITHOLOGIC LOGS
FOR OBSERVATION WELLS

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		
20		Gravelly sand
		Silty sand
		Sand
40	Qb	Silty sand
		Sand
60		
80	Qh	Gravelly sand

TD=93'



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PROJECT No. C-20



HERCULES

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OBSERVATION WELL
OW-1

TOP OF CASING ELEV. = 4,741.09
GROUND SURFACE ELEV. = 4,738.36

STRATIGRAPHIC LOG

OW-1

- 0.0'-18.5': Gravelly sand. 50% sand, 30% gravel, 20% silt. Sand is very fine to coarse grained, subrounded to rounded quartz. Gravel is subangular to subrounded quartzite. Weak to moderate reaction to HCL. Dark brown (10YR 3/3) and brown (10YR 5/3).
- 18.5'- 21.4': Silty sand. 60% sand, 30% silt, 10% clay. Sand is very fine grained, rounded quartz. No reaction to HCL. Brown (10YR 5/3).
- 21.4'-29.0': Sand. 95% sand, 5% silt. Sand is very fine grained, rounded quartz. Thin (1/2") bedded, horizontal. Very weak to no cementation. Iron oxide stains on bedding planes. Weak reaction to HCL. Brown (10YR 5/3).
- 29.0'-40.0': Silty sand. 70% sand, 25% silt, 5% clay. Sand is very fine to fine grained, rounded quartz. Iron oxide stains on bedding planes. Thin bedded (1/2"), horizontal. Moderate to no reaction to HCL. Brown (10YR 5/3).
- 40.0'-60.0': Sand. 95% sand, 5% silt (10% gravel from 59.0' to 60.0'). Sand is very fine to fine grained, rounded quartz. From 59.0' to 60.0', sand is very fine to very coarse grained, subrounded to rounded quartz. From 59.0' to 60.0' the gravel is subrounded quartzite. From 59.0' to 60.0', larger clasts are stained with iron oxide. Thin bedded (1/2" to 1") with a laminated zone from 50.0 to 51.5', horizontal. Very weak reaction to HCL. Brown (10YR 5/3) and brownish yellow (10YR 6/6 to 6/4).
- 60.0'-93.0': Gravelly sand. 60% sand, 20% gravel, 20% silt. Sand is very fine to very coarse grained, rounded to subrounded quartz. Gravel is rounded to subrounded quartzite. Most larger clasts are stained with iron oxide. Reaction to HCL ranges from weak to strong with depth. Yellowish brown (10YR 5/4).

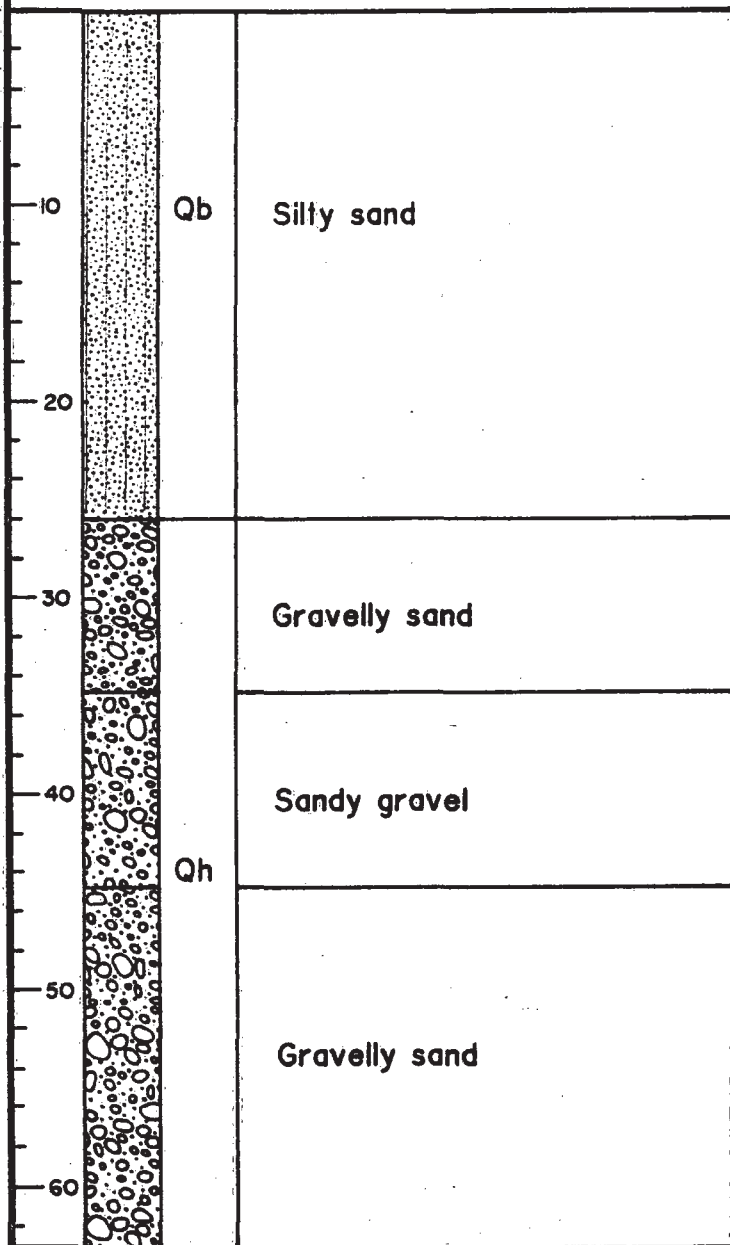
GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

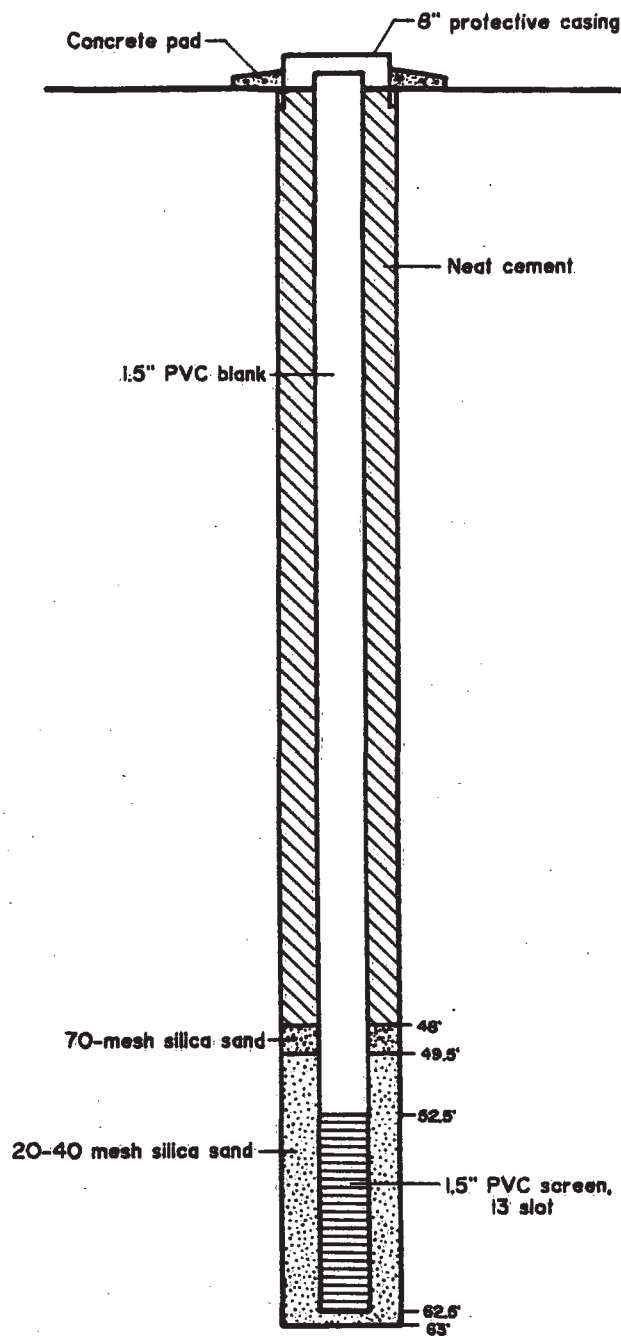
DEPTH (ft)

GRAPHIC LOG

DESCRIPTION



TD=63'



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HERCULES

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OBSERVATION WELL
OW-2

TOP OF CASING ELEV. = 4,735.75
GROUND SURFACE ELEV. = 4,733.21

STRATIGRAPHIC LOG

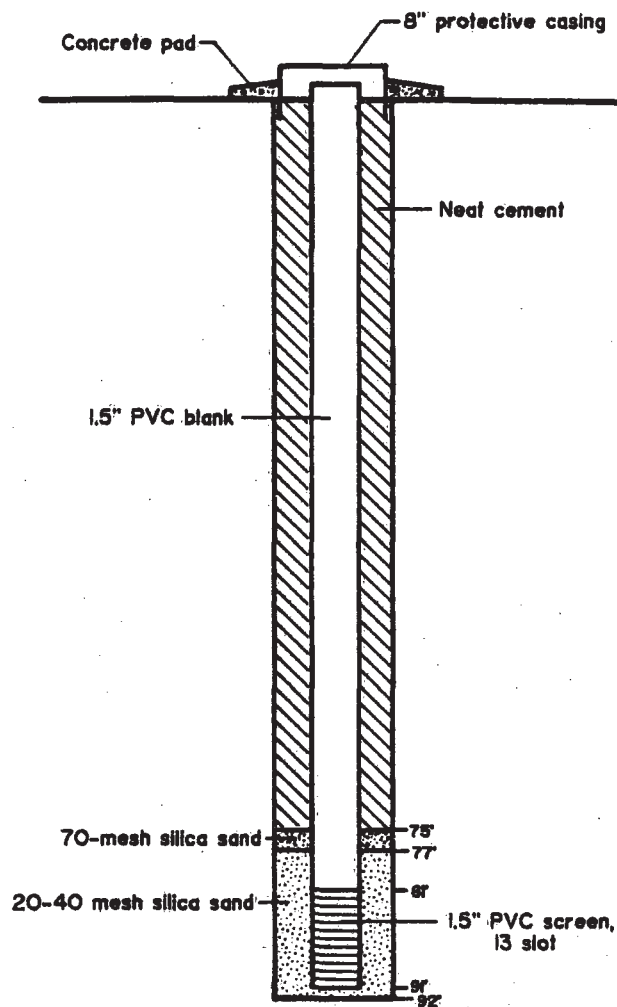
OW-2

- 0.0'-19.5': Silty sand. 75% sand, 20% silt, 5% gravel. Sand is very fine to medium grained, subrounded to rounded quartz. Gravel is subrounded quartzite, some clasts are iron oxide-stained. Moderate to weak reaction to HCl. Dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2).
- 19.5'-26.0': Silty sand. 80% sand, 20% silt. Sand is very fine to medium grained, rounded, quartz and quartzite. Moist. Iron staining on the bedding planes and on sand grains. Thin bedded (1/8" to 1/2"), horizontal. Very weak to no reaction to HCl. Very weak to no cementation. Brown (10YR 5/2).
- 26.0'-35.0': Gravelly sand. 75% sand, 15% gravel, 10% silt changing with depth to 50% sand, 30% gravel, 15% silt, 5% clay. Sand is very fine to coarse grained, subrounded to rounded quartz. Gravel is subrounded quartzite. Most sand and gravel are stained with iron and manganese oxides. Few micas. Very weak to no cementation. Reaction to HCl increases from very weak to moderate with depth. Brown (10YR 5/3).
- 35.0'-45.0': Sandy gravel. 45% gravel, 40% sand, 10% silt, 5% clay. Gravel is subrounded quartzite. Sand is very fine to coarse grained, subrounded to rounded quartz. Iron oxide stains on gravels. Carbonate coatings on larger clasts. Fines are calcareous. Very strong reaction to HCl. Brown (10YR 5/3).
- 45.0'-63.0': Gravelly sand. 50% sand, 30% gravel, 15% silt, 5% clay. Sand is fine to very coarse grained (predominantly coarse), subrounded to rounded quartz. Gravel is subrounded to subangular quartzite. Some larger clasts are stained with iron and manganese oxides. Fines have a moderate reaction to HCl. Brown (10YR 5/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
		Qb Sandy silt
20		Sandy silt
40	Qh	Silty sand
60		
80		



TD=92'



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HERCULES

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OBSERVATION WELL
OW-3

TOP OF CASING ELEV. = 4,887.15
GROUND SURFACE ELEV. = 4,884.97


STRATIGRAPHIC LOG

OW-3

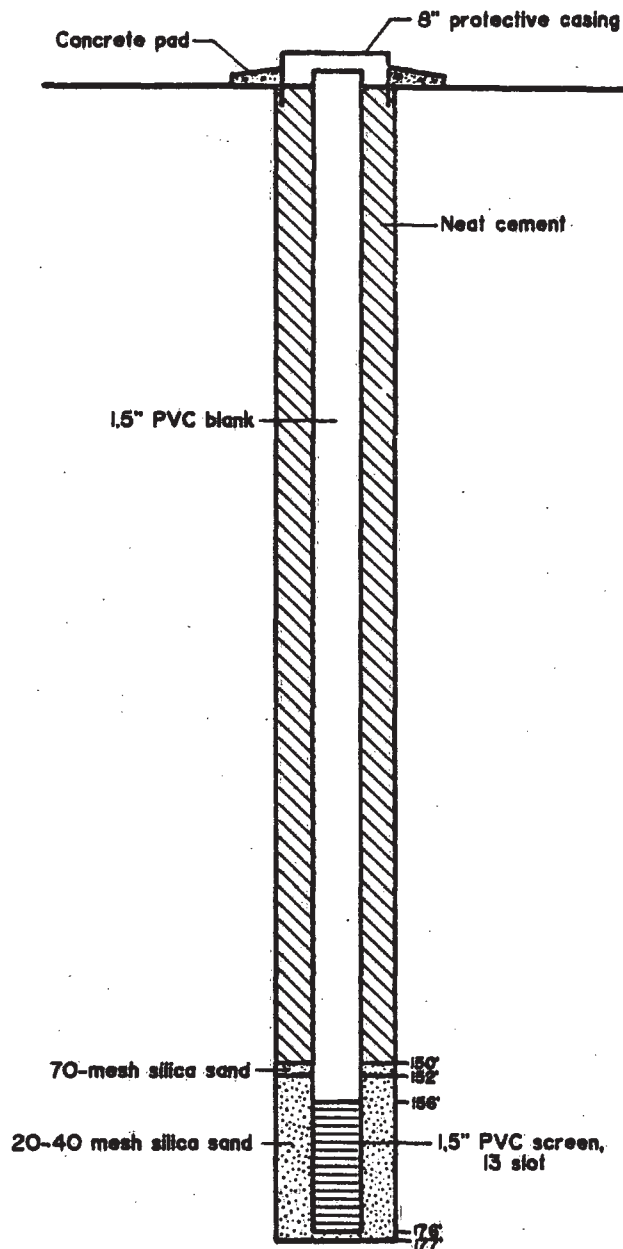
- 0.0'-4.0': Sandy silt. 80% silt, 20% sand. Sand is very fine grained, rounded quartz. Rare quartzite gravel. Strong reaction to HCl. Brown (10YR 5/3).
- 4.0'-10.0': Sandy silt. 70% silt, 20% sand, 10% gravel. Sand is very fine to medium grained, subrounded quartz. Gravel is subrounded quartzite. Few mica flakes. Strong reaction to HCl. Brown (10YR 5/3).
- 10.0'-14.0': Sandy silt. 80% silt, 20% sand. Sand is very fine grained, rounded quartz. Rare quartzite gravel. Strong reaction to HCl. Brown (10YR 5/3).
- 14.0'-30.0': Sandy silt. 60% silt, 40% sand. Sand is very fine grained, rounded quartz. Moderate reaction to HCl. Brown (10YR 5/3).
- 30.0'-36.0': Silty sand. 60% sand, 35% silt, 5% gravel. Sand is very fine to medium grained quartz. A few gravel fragments are iron oxide-stained. Weak reaction to HCl. Brown (10YR 5/3).
- 36.0'-92.0': Silty sand. 50% sand, 25% silt, 15% gravel, 10% clay. Sand is very fine to coarse grained, subrounded to rounded quartz. Gravel is subrounded to subangular, quartzite with a minor percentage of andesite-latite. Clay is <1% from 75.0' to 92.0'. Some iron oxide staining on larger clasts. A few mica flakes. Weak to very weak reaction to HCl. Brown (10YR 5/3).

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
0		Sandy gravel
20		
40		
60		
80	Qh	Silty sand
100		
120		
140		
160		

TD=177'



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HERCULES

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OBSERVATION WELL
OW-4

TOP OF CASING ELEV. = 4,599.69
GROUND SURFACE ELEV. = 4,597.82

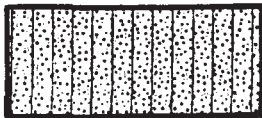
STRATIGRAPHIC LOG

OW-4

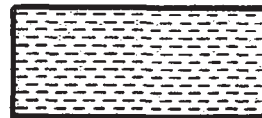
- 0.0'-4.0': Sandy gravel. 30% fines. Gravel consists of quartzite, sandstone and limestone. Quartzite and carbonate boulders scattered on ground surface. Dark brown (10YR 3/3).
- 4.0'-177.0': Silty sand. 60% sand, 20% silt, 20% gravel. Sand is very fine to coarse grained quartz. Gravel is 80% quartzite, 20% andesite-latite. Yellowish brown (10YR 5/4).



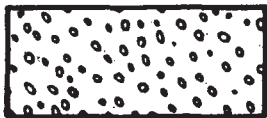
Conglomerate



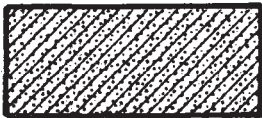
Silty sand



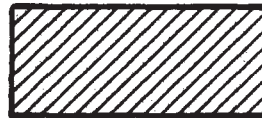
Siltstone / Claystone



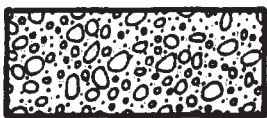
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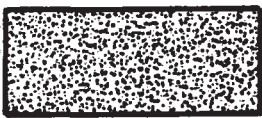
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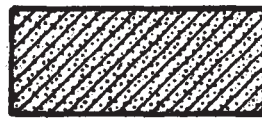
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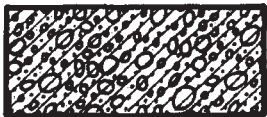
Sand & gravel



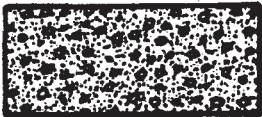
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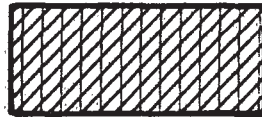
Sandy clay



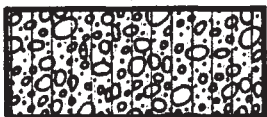
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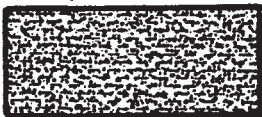
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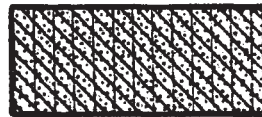
Silty clay



Sandy gravel with silt



Sandstone & all
mud matrix



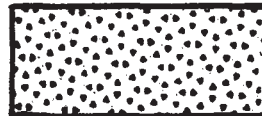
Sandy silty clay



Silty gravel



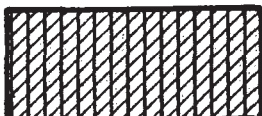
Silt



Tuff



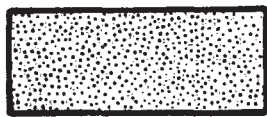
Clay & gravel



Clayey silt



Limestone



Sand



BACCHUS
WORKS

GEOLOGIC SYMBOLS

PREPARED BY
EarthFax Engineering Inc.

DATE
11/88

Hercules Aerospace Company
Bacchus Works

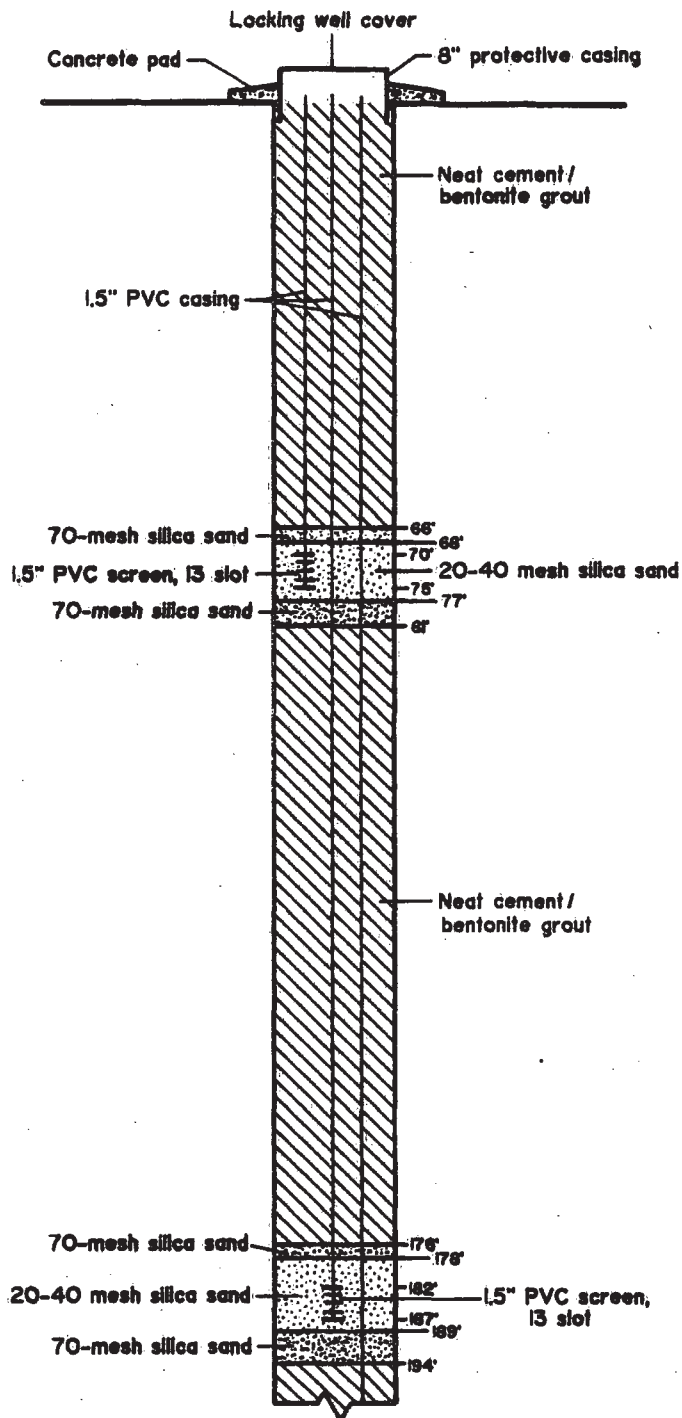
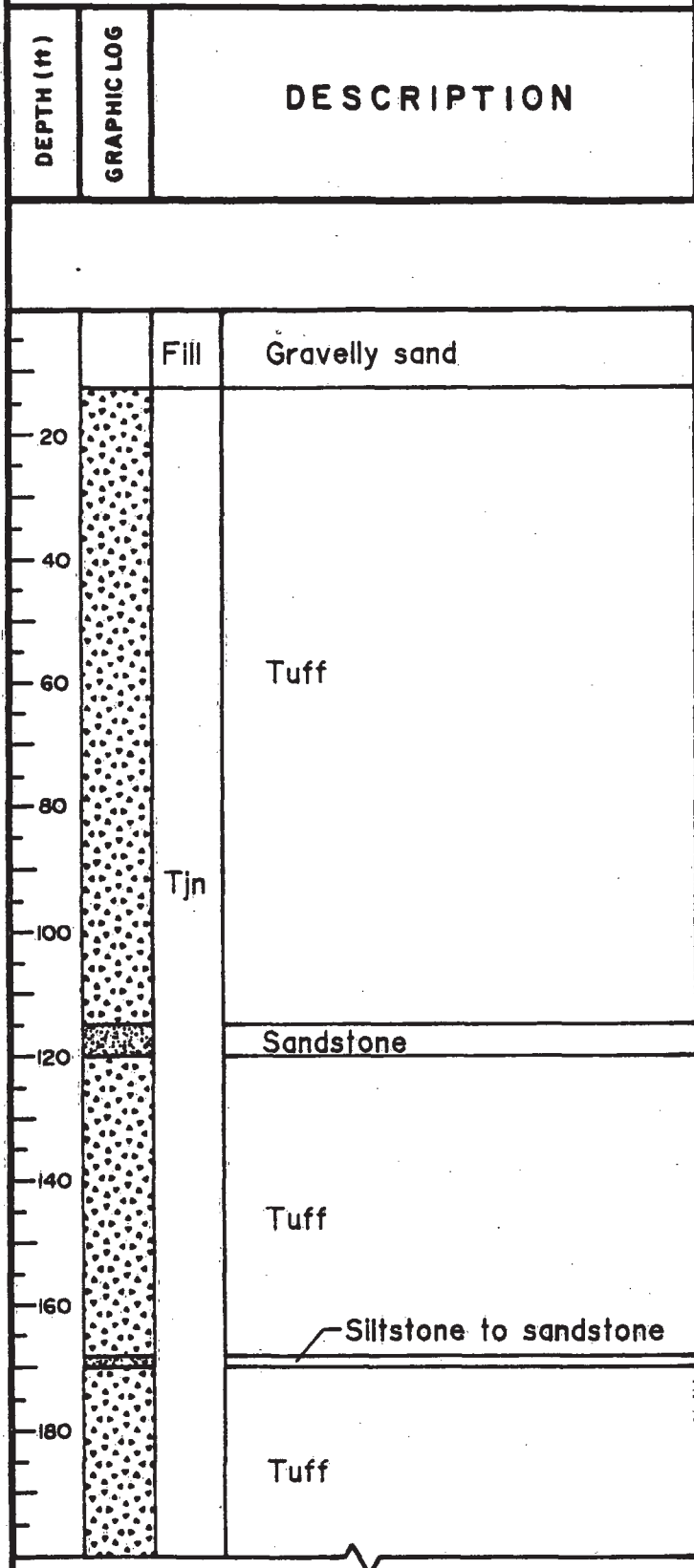
Groundwater Quality Assessment
November 15, 1988

APPENDIX C

COMPLETION AND LITHOLOGIC LOGS
FOR DEEP PIEZOMETERS

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



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EarthFax PROJECT No. C-20



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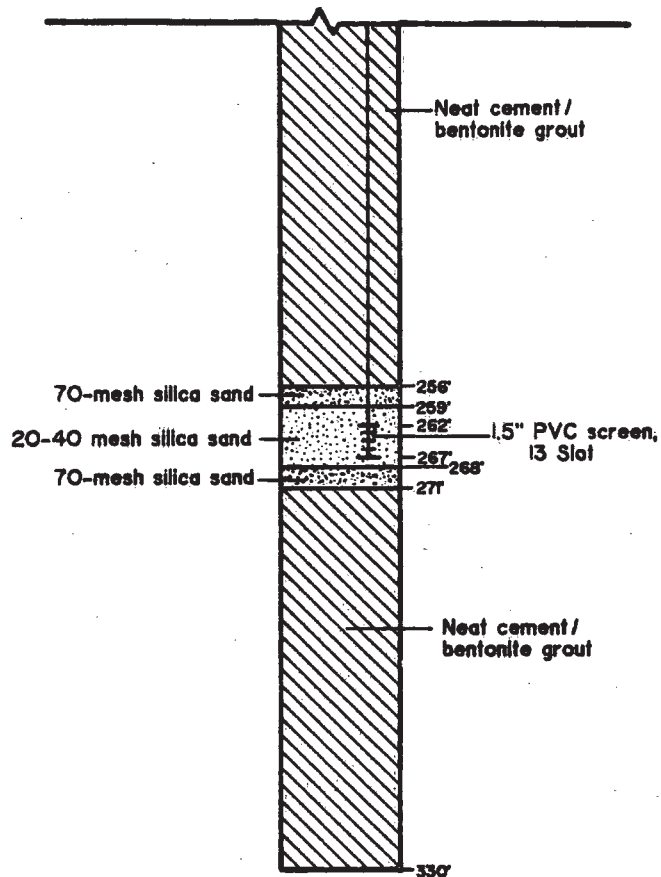
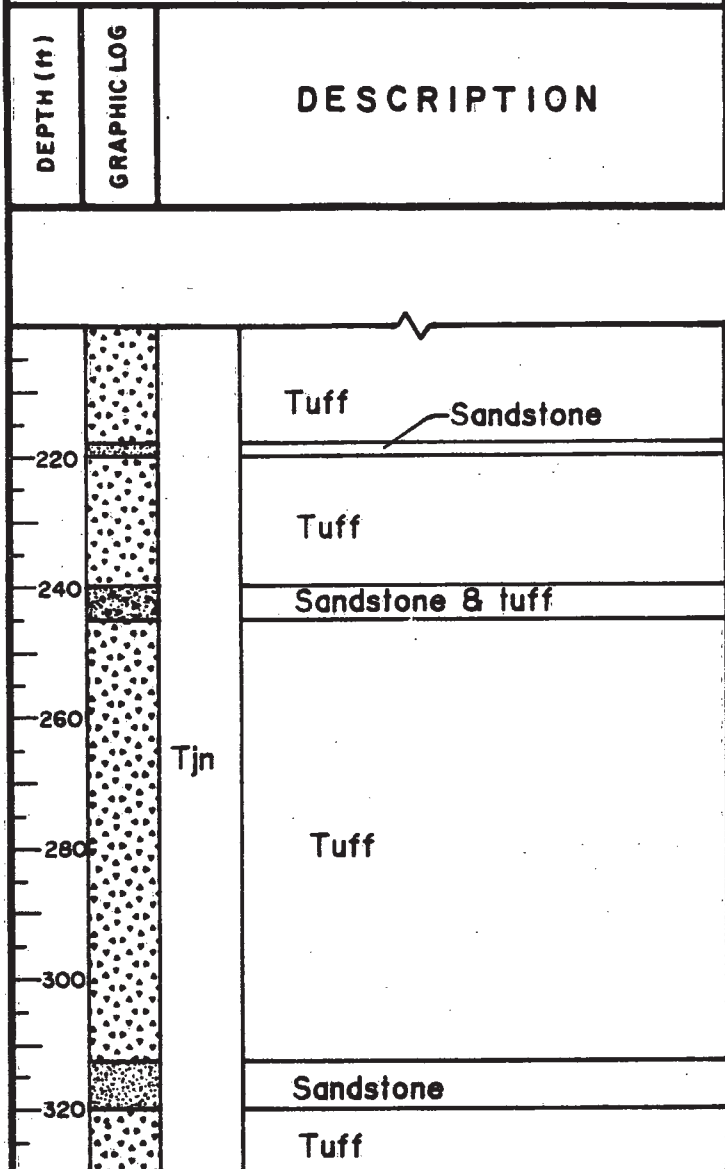
DEEP PIEZOMETER DP-1

Pg 1

TOP OF CASING ELEV. = 4,675.37
GROUND SURFACE ELEV. = 4,673.42

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



TD=330'



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PROJECT No. C-20



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DEEP PIEZOMETER DP-1

Pg 2

TOP OF CASING ELEV. = 4,675.37
GROUND SURFACE ELEV. = 4,673.42

STRATIGRAPHIC LOG
DP-1

- 0.0'-13.0': Gravelly sand fill material. 40% sand, 30% gravel, 20% cobbles, 10% silt. Sand is very fine to coarse grained quartz. Gravel and cobbles are subrounded to subangular quartzite and sandstone. Larger clasts are carbonate coated. Silty matrix reacts moderately with HCl. Brown (10YR 3/3).
- 13.0'-115.0': Tuff. Vitric, very fine grained, soft, with interlayered zones of altered ash (clay). Massive bedding with carbonate veining. Traces of quartz sand and dark minerals. Reacts moderately to strongly with HCl. Light brownish gray (2.5Y 6/2) and light olive gray (5Y 6/2).
- 115.0'-120.0': Tuffaceous sandstone. Sandstone is very fine to fine grained rounded quartz. Ash is vitric, very fine to fine grained. Moderately hard to soft. Thin calcareous banding. Bedding is thin to laminated, locally cross-bedded. Weak iron oxide staining. No fractures in core sample. Olive gray (5Y 5/2) to pale olive (5Y 6/3).
- 120.0'-168.0': Tuff. Vitric, very fine grained. Moderately soft. Carbonate cement. Laminated to thin bedded. Random iron and manganese stains. Moderate to weak reaction to HCl. Light olive gray (5Y 6/2).
- 168.0'-170.0': Sandy siltstone to silty sandstone. Sandstone is very fine grained, rounded quartz. Moderately soft to very soft in zones. Massive bedding. No fractures. No reaction to HCl. Gray (5Y 6/1) to white (5Y 8/1).
- 170.0'-215.0': Tuff. Vitric, very fine grained. Interlayered zones of altered ash (clay). Contains a trace of very fine to fine grained quartz sand and a few coarse dark minerals. Soft. Thin bedded to laminated. Moderate reaction to HCl. Gray (5Y 6/1) to white (5Y 8/1).
- 215.0'-218.0': Tuff. As above, but moderately soft to moderately hard. Bedding is laminated, locally cross-bedded. Iron stains along bedding. Very weak reaction to HCl. Pale olive (5Y 6/4).
- 218.0'-220.0': Tuffaceous sandstone. Fine grained, rounded quartz and very fine to fine grained vitric ash.

Very soft in zones. Massive bedding. Some silty clay lenses. No fractures. No reaction with HCl. Light olive gray (5Y 6/2).

220.0'-240.0': Tuff. As above, but contains a trace of very fine grained quartz sand and minor amounts of coarse grained dark minerals. Soft. Thin bedded to laminated, carbonate cement. Moderate reaction to HCl. Pale olive (5Y 6/4) to light olive gray (5Y 6/2).

240.0'-245.0': Sandstone and tuff. 50% tuff, as above, and 50% sandstone, fine grained, subrounded to subangular quartz, moderately soft, poorly cemented, trace of dark minerals. Tuff is iron and manganese stained. Moderate reaction to HCl. Very pale brown (10YR 8/3).

245.0'-264.0': Tuff. As above, but degree of clay alteration increases with depth. Contains a trace of sand, predominantly very fine to fine grained, rounded to subrounded quartz with minor amounts of coarse dark minerals. Soft. Thin bedded to laminated, carbonate cement. Moderate reaction to HCl. Pale olive (5Y 6/4) to light olive gray (5Y 6/2).

264.0'-270.0': Tuff. As above, but moderately hard (breaks with sharp edges). Laminated to thin bedded. Strong reaction to HCl. No fractures. Dark gray (5Y 4/1).

270.0'-313.0': Tuff. As above, but soft to moderately soft. Dark gray (5Y 4/1).

313.0'-315.0': Tuffaceous sandstone. Sandstone is very fine to fine grained, rounded quartz. Moderately hard to moderately soft. Massive bedded. No fractures. No reaction to HCl. Olive (5Y 5/4).

315.0-320.0': Tuffaceous sandstone. As above, but contains very soft, poorly indurated zones 0.0' to 1.5' thick, otherwise hard to moderately soft. Massive bedding. Carbonate cement. Reacts strongly with HCl. Olive (5Y 5/3) to pale olive (5Y 6/3).

320.0'-330.0': Sandy tuff. Vitric, very fine grained. Sand is very fine grained, rounded quartz. Moderately soft. Carbonate cement. Strong reaction to HCl. Pale olive (5Y 6/3).

TARGET SHEET
EPA REGION VIII
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 424437

SITE NAME: HERCULES INC/BACCHUS WORKS

DOCUMENT DATE: 11/15/1988

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☒ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

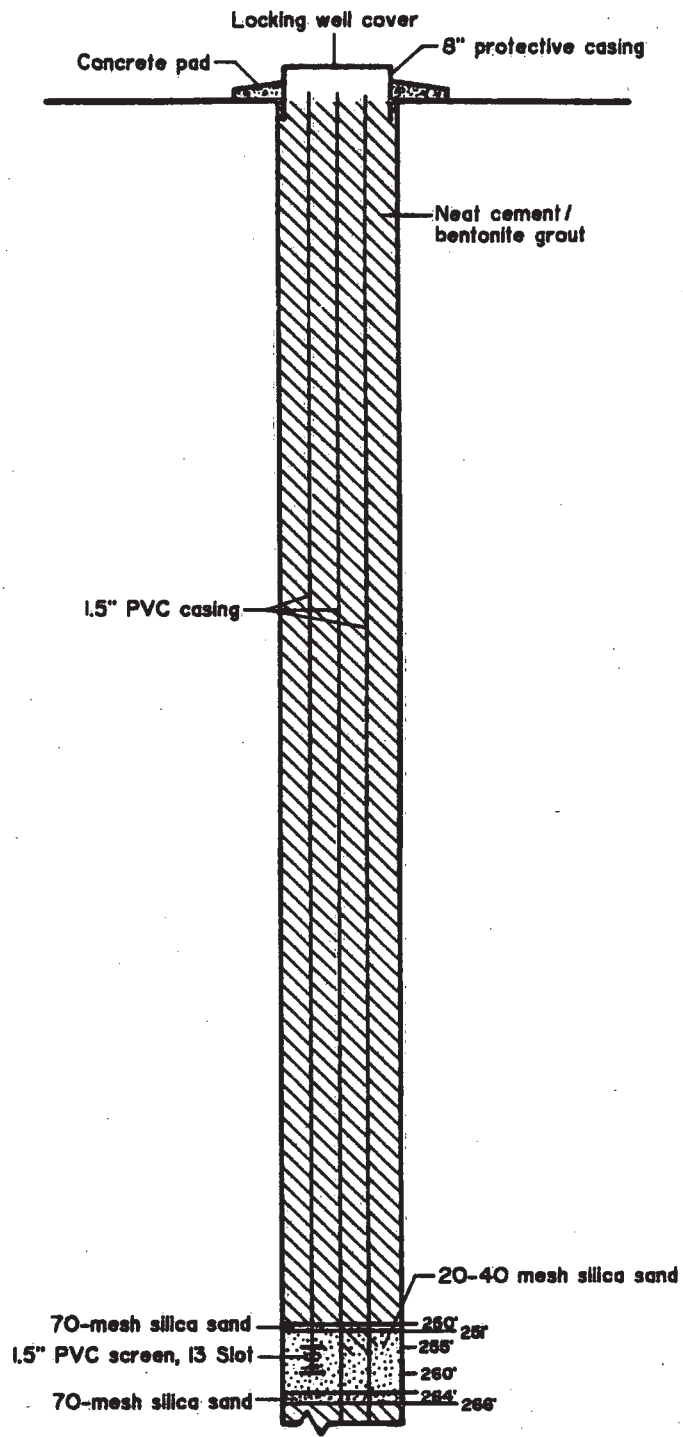
DOCUMENT DESCRIPTION:

WELEX Compensated Density Neutron Log, Dipmeter Log, and Dual
Induction Log

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		
40		
60		Qh Gravelly sand
80		
100		
120		Sandstone
140		
160		
180		Tcw Alternating siltstone & sandstone
200		
220		
240		
260		



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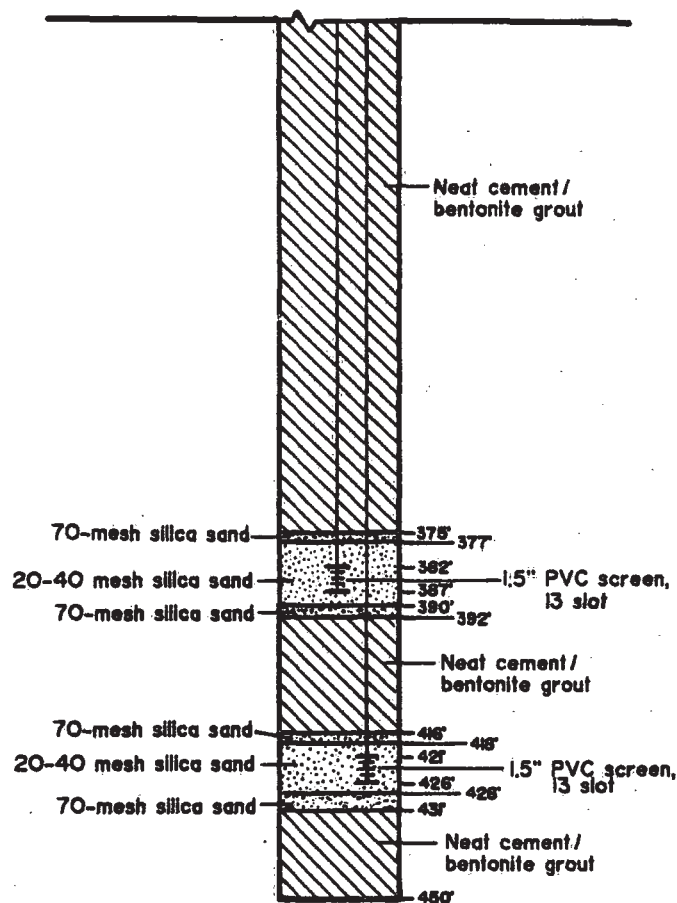
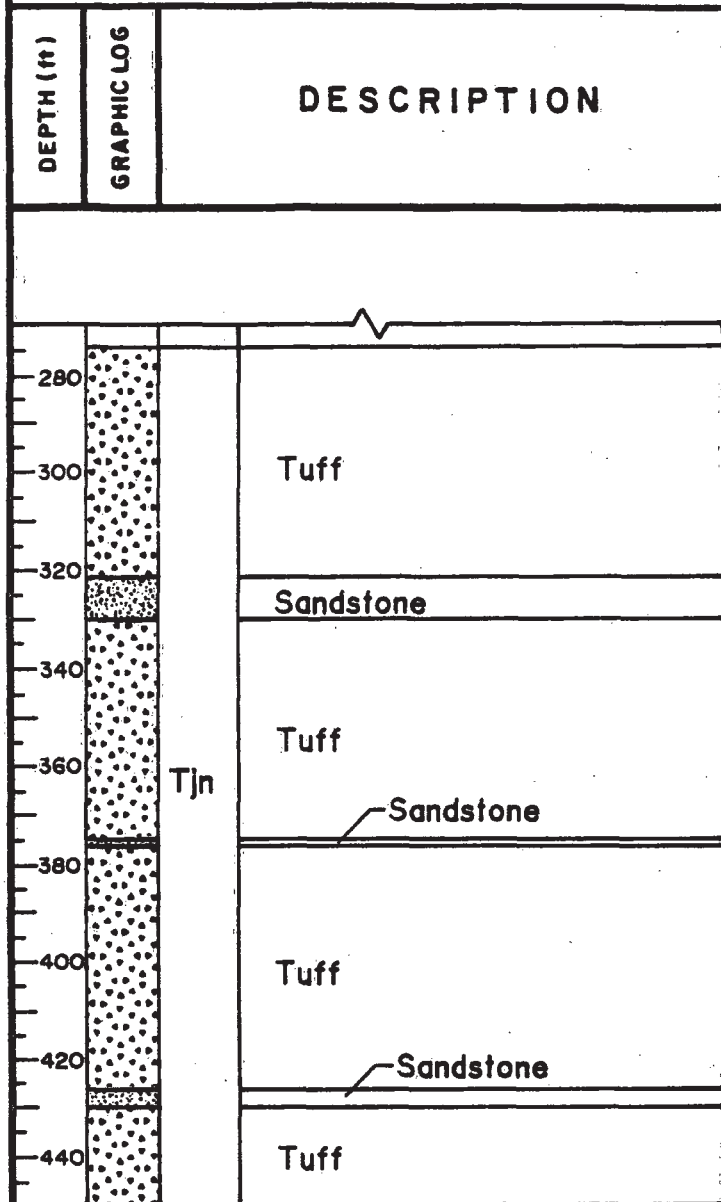
DEEP PIEZOMETER DP-2

Pg 1

TOP OF CASING ELEV. = 4,810.12
GROUND SURFACE ELEV. = 4,808.08

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



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EarthFax PROJECT No. C-20



HERCULES

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WORKS

DEEP PIEZOMETER DP-2

Pg 2

TOP OF CASING ELEV. = 4,810.12
GROUND SURFACE ELEV. = 4,808.08

STRATIGRAPHIC LOG

DP-2

- 0.0'-118.0': Gravelly sand. 40% sand, 30% gravel, 20% cobbles, 5% boulders and 5% silt. Sand is medium to very coarse grained, subrounded to subangular quartz. Gravel is quartzite and sandstone. Clay beds from 74.0' to 74.5' and from 108.0' to 108.5'. Larger clasts are carbonate coated in upper 40' of interval. Traces of volcanic ash throughout. Caving and circulation loss at 40'. Sandy matrix reacts strongly to HCl. Yellowish brown (10YR 5/4).
- 118.0'-124.5': Sandstone. Fine to medium grained, rounded quartz. Moderately soft. Contains some vitric ash. Moderate reaction to HCl. Pale olive (5Y 6/3).
- 124.5'-127.5': Siltstone. Hard to soft in zones. Bedding is laminated to massive. A few thin quartz sand lenses are present. Some manganese staining along bedding planes. Fractured zones throughout. Moderate reaction to HCl. Light olive gray (5Y 6/2) to pale olive (5Y 6/3).
- 127.5'-130.0': Tuffaceous sandstone. Fine grained rounded quartz and vitric ash. Soft to very soft. Massive bedding. Irregularly spaced, 1/2" thick, iron oxide stained zones. Moderate reaction to HCl. Pale olive (5Y 6/3).
- 130.0'-274.0': Alternating siltstone and tuffaceous sandstone. Several gravel beds (1" thick) from 221.6'-222.6'. Sandstone is brownish yellow (10YR 6/4). Siltstone is pale yellow (5Y 7/3).
- 274.0'-280.0': Sandy tuff. Vitric, with fine grained, rounded quartz sand. Unit contains localized chalky, calcareous zones. Moderately hard to soft. Bedding is laminated to massive and cross-bedded. Hair-line fractures in chalky calcareous zones. Moderate to strong reaction to HCl. Light olive gray (5Y 6/2) to light gray (5Y 7/1).
- 280.0'-321.0': Tuff. As above, with interbeds of sandstone, very fine to fine grained, rounded quartz. Moderately soft to very soft. Carbonate cement. Moderate reaction to HCl. Light olive gray (5Y 6/2).
- 321.0'-330.0': Tuffaceous sandstone with interbeds of coarse sand and clayey sand. Predominantly fine grained. Finer grains are vitric ash and rounded quartz. Coarse grains are subrounded to rounded quartz. Moderately hard to soft. Massive bedding, locally cross-bedded. Some iron oxide staining along

bedding planes. Dendritic manganese in some zones. Weak to strong reaction (in clay) to HCl. Pale olive (5Y 6/3); brown (10YR 5/3) in coarse sand zones.

330.0'-375.0': Tuff. Vitric, fine to very fine grained with thin interbeds of fine to medium grained sandstone. Moderately soft to very soft. Carbonate cement. Moderate reaction to HCl. Light olive gray (5Y 6/2).

375.0'-376.0': Tuffaceous sandstone with clayey sandstone zones (1/4" to 1" thick). Sandstone is medium to fine grained, rounded quartz. Soft to moderately soft. Bedding is thin to laminated, locally cross-bedded. Clay zones react strongly to HCl. Light yellowish brown (2.5Y 6/4).

376.0'-380.0': Tuff, as above, grading to tuffaceous sandstone with depth. Sandstone is medium to coarse grained, subrounded, quartz. Moderately hard to moderately soft. Sandstone is increasingly poorly indurated with depth. Massive bedding. Core from 376.5' to 375.7' is brecciated. Pale brown (10YR 6/3), light yellowish brown (2.5Y 6/4) in sandy zones.

380.0'-426.0': Tuff with minor tuffaceous sandstone lenses. As above, but moderately soft to very soft. Moderate reaction to HCl. Yellowish brown (2.5Y 6/4).

426.0'-430.0': Tuffaceous sandstone to tuffaceous siltstone. Sandstone is fine grained, rounded quartz. Gravel from 426.0'-426.6' contains 1/4" to 1" subrounded quartzite and sandstone fragments in silt matrix. Some clayey lenses. Moderately hard to moderately soft. Bedding is massive to laminated, locally cross-bedded. Iron oxide in stained bands throughout the sandstone beds. No reaction to HCl. Pale olive (5Y 6/3).

430.0'-450.0': Tuff with coarse sand and gravel lenses. Tuff as above. Gravel is subrounded quartzite. Random iron staining throughout interval. Clay content increases with depth. Very dark gray (5Y 3/1) calcareous marl at 450.0'. Very strong reaction to HCl throughout the interval. Pale olive (5Y 6/3).

TARGET SHEET
EPA REGION VIII
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 424437

SITE NAME: HERCULES INC/BACCHUS WORKS

DOCUMENT DATE: 11/15/1988

DOCUMENT NOT SCANNED

Due to one of the following reasons:

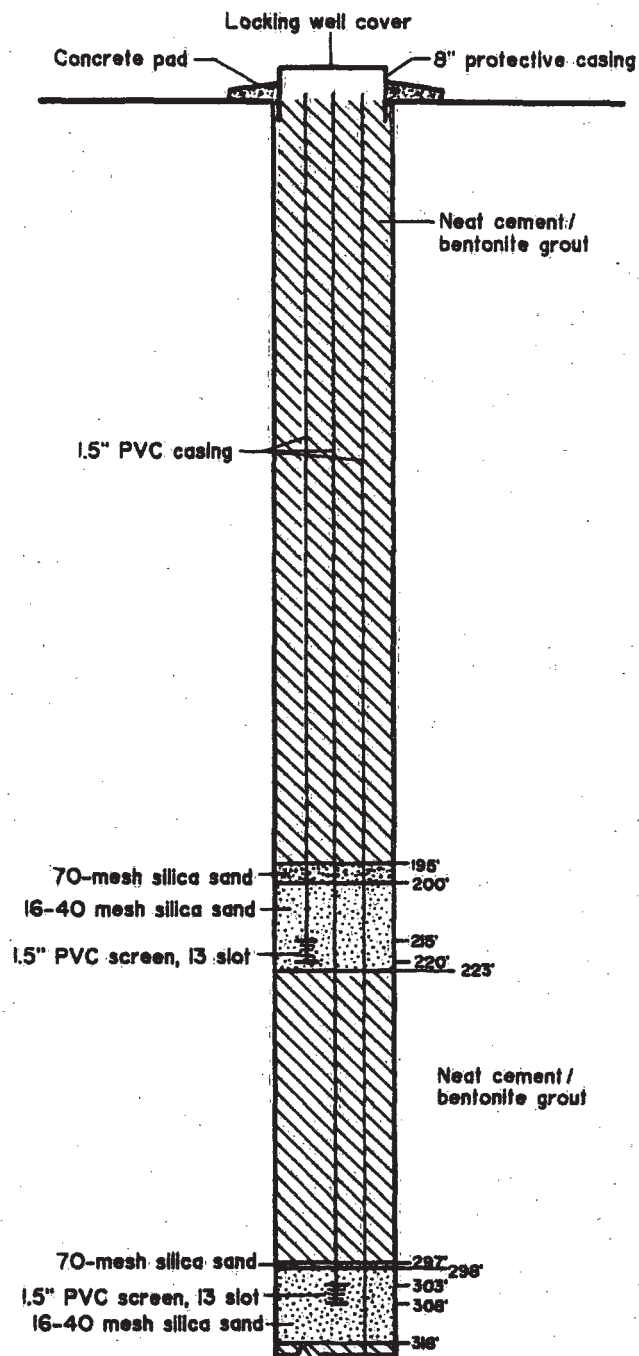
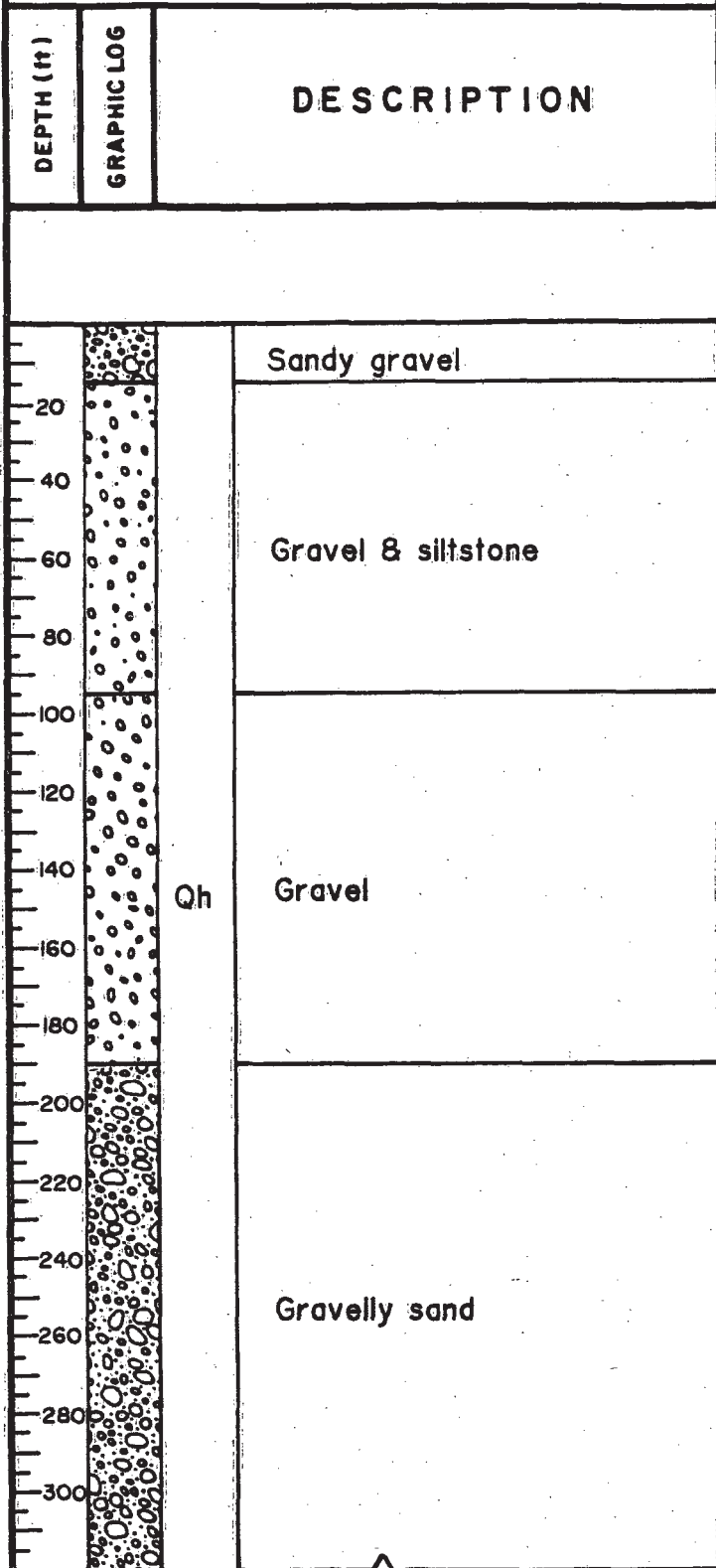
- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☒ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

WELEX Compensated Density Neutron Log and Dipmeter Log

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



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HERCULES

BACCHUS
WORKS







DEEP PIEZOMETER DP-3

Pg 1

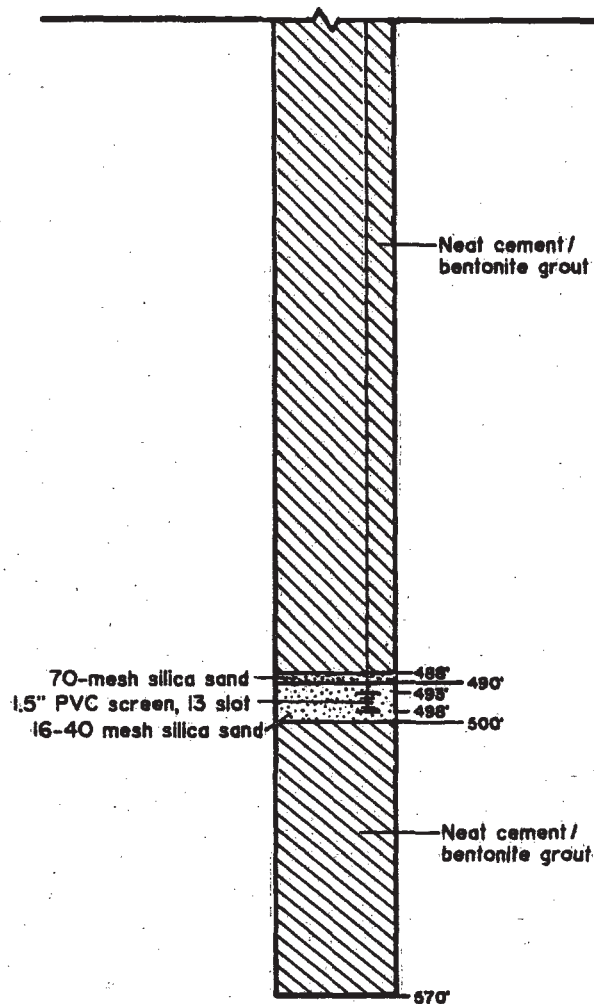
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GROUND SURFACE ELEV. = 4,547.78

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
340		Qh Gravelly sand
360		Tcw Sandstone
380		
400		
420		
440		
460		
480		
500		
520		Conglomerate & sandstone
540		Sandstone
560		Limestone & sandstone
		Sandstone

TD-570'



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DEEP PIEZOMETER DP-3

Pg 2

TOP OF CASING ELEV. = 4,549.40
GROUND SURFACE ELEV. = 4,547.78

STRATIGRAPHIC LOG
DP-3

- 0.0'-15.0': Sandy gravel. 70% quartzite gravel, 30% sand, subrounded, occasional cobbles and boulders.
- 15.0'-20.0': 60% quartzite gravel, very fine grained, rounded, breaks both around and across grains, white, gray, brown; 40% siltstone, light-dark brown, sandy. Rig chatter suggests cobbles and boulders predominate.
- 20.0'-95.0': Quartzite gravel and siltstone as above, but drilling rate suggests clast size is smaller (probably gravel-cobble size).
- 95.0'-190.0': 90% Quartzite gravel as above, 10% carbonate and andesite-latite. Sand is mostly fine grained, poorly sorted, reddish brown to brown.
- 190.0'-340.0': Gravelly sand, with occasional quartzite cobbles.
- 340.0'-420.0': Sandstone, poorly indurated, some quartzite cobbles.
- 420.0'-500.0': Sandstone, fine grained, moderately soft, friable, thin to medium-bedded, some silty zones. Dark yellowish brown (10YR 4/4).
- 500.0'-520.0': 60% volcanic conglomerate (andesite-latite) and 40% brown lithic arenite. Trace of quartzite gravel.
- 520.0'-521.0': Conglomeratic sandstone. Granules and pebbles constitute 30% of rock volume, with small amounts of volcanic rock fragments. Brown (7.5Y 5/4).
- 521.0'-530.0': Sandstone. Lithic arenite with 5% pebbles. Sand fraction contains up to 30% vitric ash. Brown (7.5YR 4/6).
- 530.0'-555.0': 60% white micritic limestone and 40% very fine grained brown lithic arenite.
- 555.0'-570.0': Sandstone. Lithic arenite which contains 20-30% vitric ash. Contains calcareous nodules. Reddish brown siltstone. Brown (7.5Y 5/4) to yellowish red (5YR 5/6).

TARGET SHEET
EPA REGION VIII
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 424437

SITE NAME: HERCULES INC/BACCHUS WORKS

DOCUMENT DATE: 11/15/1988

DOCUMENT NOT SCANNED

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- ☐ 3-DIMENSIONAL
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- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
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- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

BPB Borehole DP-3 Focussed Electric Log, Gamma Ray-Density-Caliper
Log, and Gamma Ray-Neutron Log

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
20		
40		
60		
80		
100		
120		
140		
160		
180		
200		
220		
240		
260		

Qh

Silty sand

Sandy claystone

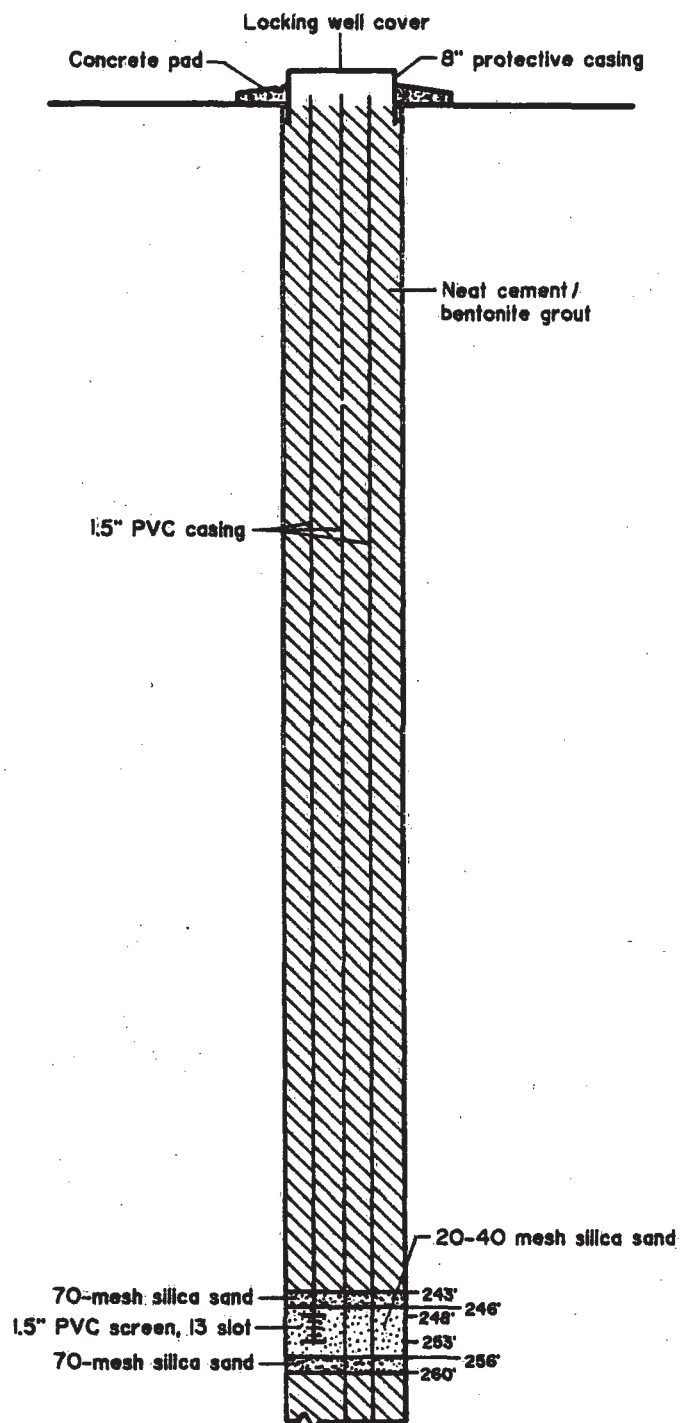
Sandstone

Sandy siltstone

Tcw

Siltstone

Sandy siltstone



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DEEP PIEZOMETER DP-4
Pg 1

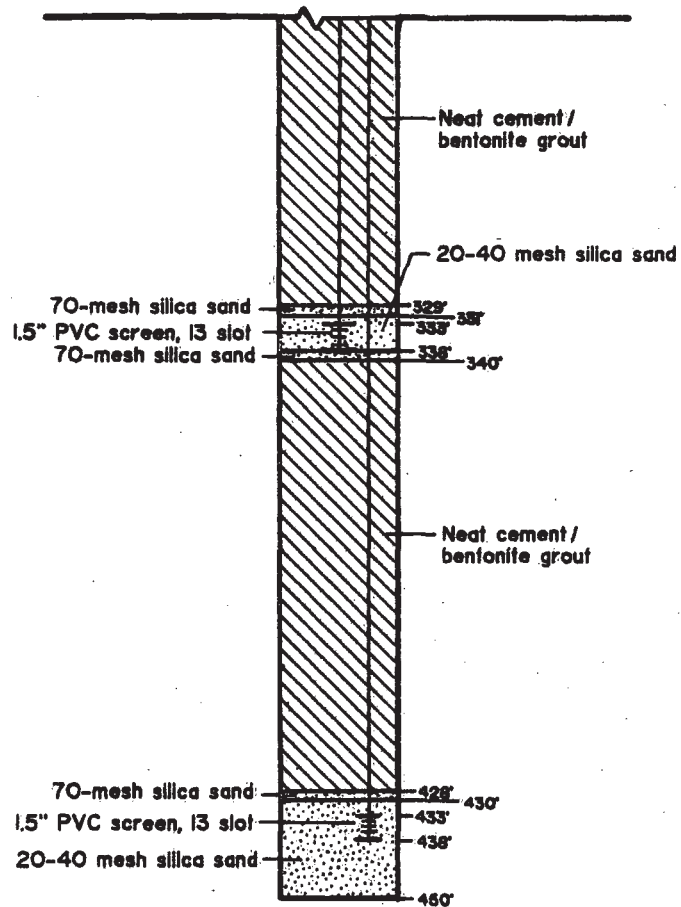
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GROUND SURFACE ELEV. = 4,932.68

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS

DEPTH (ft)	GRAPHIC LOG	DESCRIPTION
280		Sandy siltstone
		Siltstone
300		
320		Sandy siltstone
340		
360	Tcw	
380		Siltstone
400		
420		
440	Tjn	Siltstone Sand
		Siltstone

TD=450'



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HERCULES

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DEEP PIEZOMETER DP-4

Pg 2

TOP OF CASING ELEV. = 4,934.79
GROUND SURFACE ELEV. = 4,932.68

STRATIGRAPHIC LOG
DP-4

- 0.0'-131.0': Silty sand. 45% sand, 20% silt, 20% gravel, 15% cobbles and boulders, 5% clay. Sand is very fine to coarse grained, subrounded to sub-angular, quartz. Gravel, cobbles, and boulders are quartzite and sandstone. Larger clasts are carbonate-coated. Moderate to strong reaction to HCl. Dark yellowish brown (10YR 4/4).
- 131.0'-135.0': Sandy claystone. 50% clay, 30% sand, 20% silt. Clay is altered vitric ash. Sand is fine grained rounded quartz. Silt is vitric ash. Weak reaction to HCl. Very pale brown (10YR 7/4).
- 135.0'-145.0': Sandstone. Very fine to very coarse grained, rounded quartz with some fine sand-size vitric ash. Moderately hard. Bedding is laminated to massive, locally cross-bedded. Hair-line fractures from 135.7' to 136.2'; 140.1' to 140.6'; 144.5' to 144.8'. Moderate reaction to HCl. Pale brown (10YR 6/3).
- 145.0'-182.0': Sandstone as above. Pale brown (10YR 6/3).
- 182.0'-190.0': Sandy siltstone. Sand is fine grained, rounded quartz. Moderately soft to soft in zones. Massive bedding, no fractures or voids. Iron and manganese oxides throughout. Moderate to locally weak reaction to HCl. Pale brown (10YR 6/3), minor light olive gray (5Y 6/2).
- 190.0'-230.5': Siltstone. Contains a trace of sand which is very fine to medium grained, rounded quartz. Firm to soft. Some iron staining. Moderate reaction to HCl. Pale brown (10YR 6/3), minor light olive gray (5Y 6/2).
- 230.5'-240.0': As above, but contains no quartz sand. Hairline fractures at 230.5' to 230.8' (vertical, iron and manganese oxide-filled) and at 239.7' to 240.0' (no mineralization in fracture). Brown (10YR 5/3).
- 240.0'-280.0': Sandy siltstone. Interbeds of medium to coarse grained quartz sand and andesite-latite and quartzite gravel. Moderately hard to soft. Moderate to weak reaction to HCl. Pale olive (5Y 6/3) to brown (10YR 5/3).
- 280.0'-285.0': Siltstone. Moderately soft. Iron stained. Massive bedding. No voids or fractures. Weak to moderate reaction to HCl. Brown (10YR 5/3).

DP-4 continued (page 2)

- 285.0'-290.0': Siltstone. From 288.2' to 288.7' contains sand-sized vitric ash, very poorly indurated. Pale olive (5Y 6/3), light reddish brown (5YR 6/4).
- 290.0'-330.0': Sandy siltstone. Interbeds of very fine to coarse grained quartz sand and subrounded to subangular andesite-latitude and quartzite gravel. 80% weak red (2.5YR 4/2) and 20% pale olive (5Y 6/3). The weak red fragments are subrounded, very soft, no visible bedding. Pale olive fragments are angular, moderately soft, platy with laminated bedding. Moderate to strong reaction to HCl.
- 330.0'-334.0': Siltstone. Soft. Massive bedding, horizontal. Vertical fracture with slickensides from 330.4' to 331.3'. Manganese staining along fracture surface. Moderate reaction to HCl. Pale brown (10YR 6/3) and yellowish red (5YR 5/6).
- 334.0'-340.0': Siltstone. Trace of fine grained, round quartz sand. Moderately soft. Manganese and iron oxides stain <20% of the surface area of the core section. Massive bedding. Iron oxide-filled vertical fracture from 334.3' to 334.5'. Several thin calcareous veins and small nodules (<1mm) from 338.5 to 340.0'. Reaction to HCl grades from weak to strong with depth. Grayish brown (2.5Y 5/2).
- 340.0'-384.0': Siltstone with sand lenses. Sand is very fine to coarse grained, rounded to subrounded, quartz. Moderately soft to soft. Random iron and manganese stains. Bedding is massive, locally laminated. Moderate to strong reaction to HCl. Pale olive (5Y 6/3) and light yellowish brown (10YR 6/4).
- 384.0'-390.0': Siltstone. Soft, locally very soft. Massive bedding. No voids or fractures. Random minor manganese stains. Weak to moderate reaction to HCl. Grayish brown (2.5Y 5/2).
- 390.0'-431.0': Siltstone. Contains a trace of sand, very fine to coarse grained, rounded to subrounded quartz. Moderately soft to soft. A few random iron and manganese stains are present. Massive bedding to laminated. Moderate to strong reaction to HCl. Olive (5Y 5/3) and yellowish brown (10YR 5/4).
- 431.0'-439.0': Siltstone. Contains calcareous nodules (1mm to 5mm diameter). Hairline fracture from 432.9' to 433.5, with slickensides. Dendritic manganese

DP-4 continued (page 3)

stains, slickensides. Moderate reaction to HCl.
Pale olive (5Y 6/3).

439.0'-440.0': Sand. Rounded quartz with <10% vitric ash. <5%
fines. Fine to medium grained, very loose, very
soft. Trace of mica, <5% dark minerals. Very
weak reaction to HCl. Pale olive (5Y 5/3).

440.0-450.0': Siltstone. Contains a trace of fine to coarse
grained quartz and dark minerals. Moderately soft
to soft. Massive bedding to laminated. Moderate
reaction to HCl. Pale olive (5Y 6/3).

TARGET SHEET
EPA REGION VIII
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 424437

SITE NAME: HERCULES INC/BACCHUS WORKS

DOCUMENT DATE: 11/15/1988

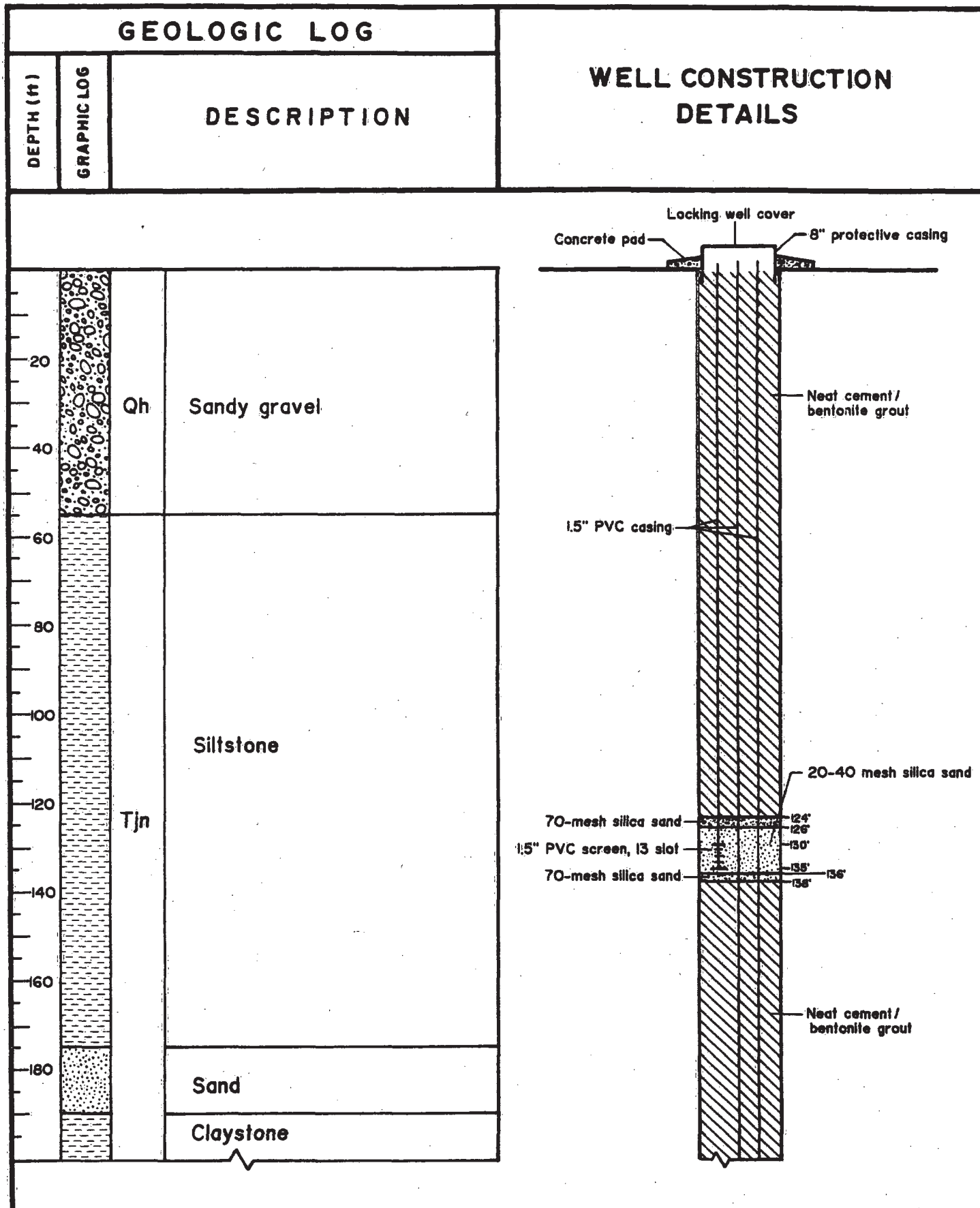
DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☒ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

WELEX Logs



EarthFax
Engineering Inc.

EarthFax PROJECT No. C-20



HERCULES

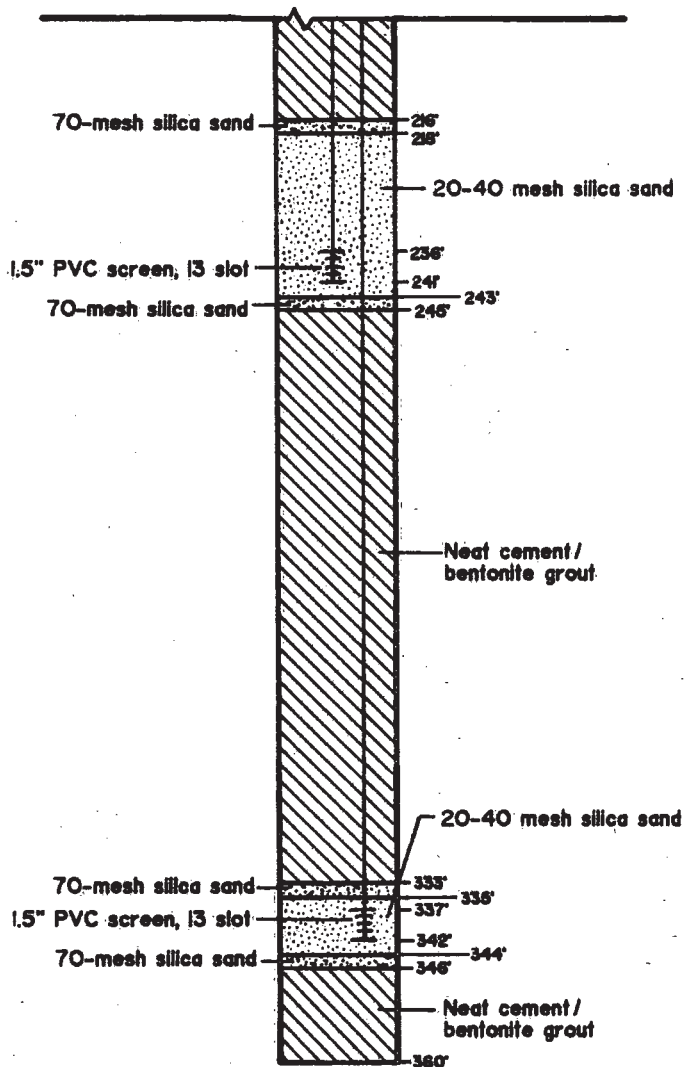
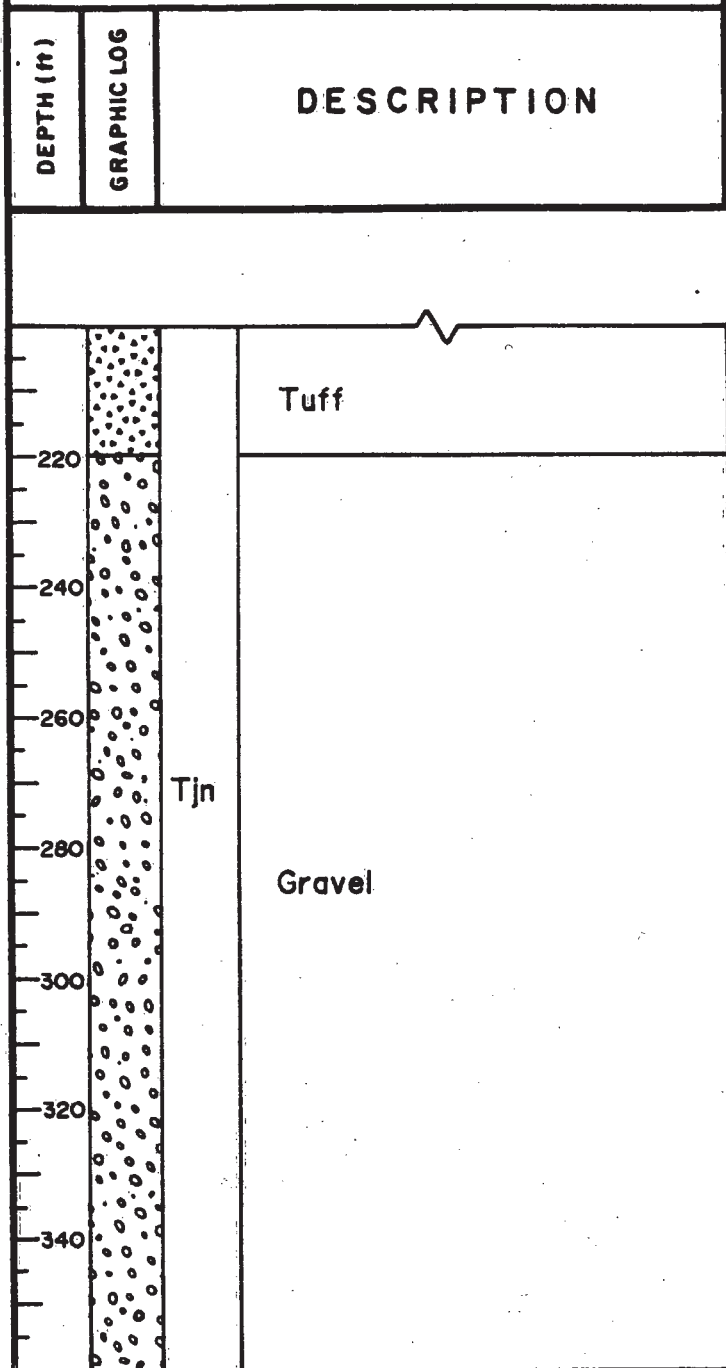
**BACCHUS
WORKS**

DEEP PIEZOMETER DP-5
Pg 1

TOP OF CASING ELEV. = 4,574.90
GROUND SURFACE ELEV. = 4,572.85

GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



TD=360'



EarthFax
Engineering Inc.

EarthFax

PROJECT No. C-20



HERCULES

BACCHUS
WORKS

DEEP PIEZOMETER DP-5

Pg 2

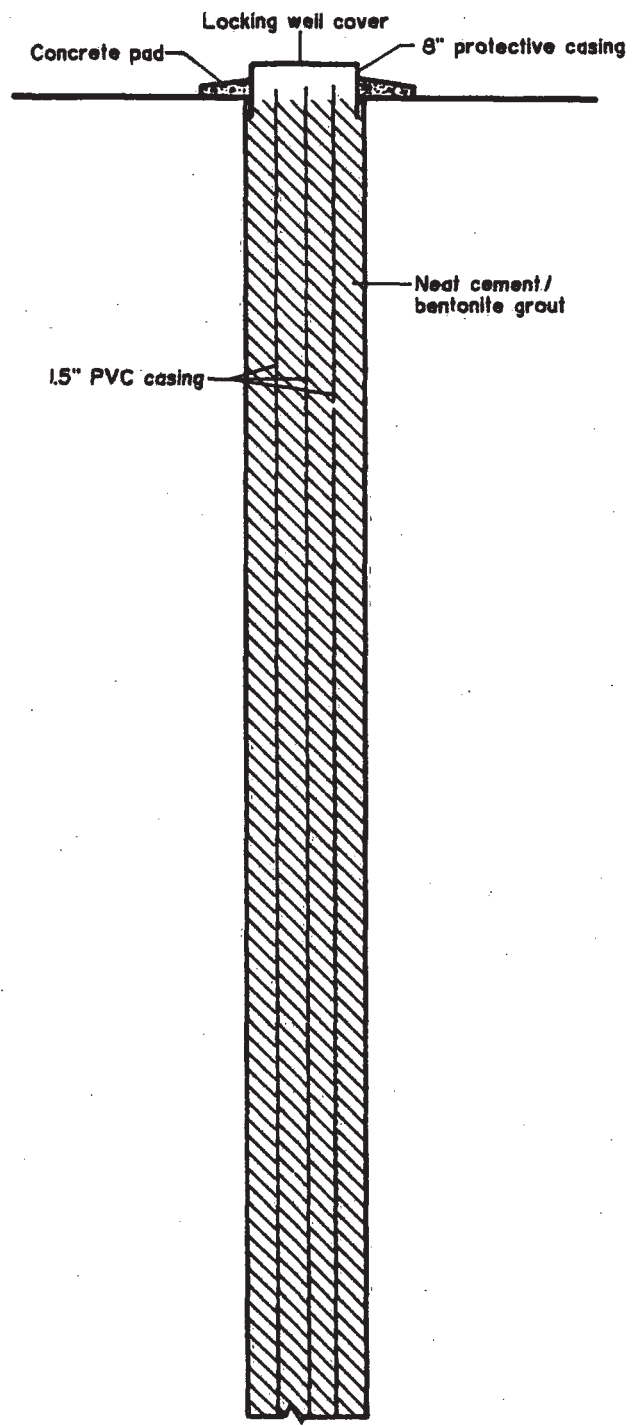
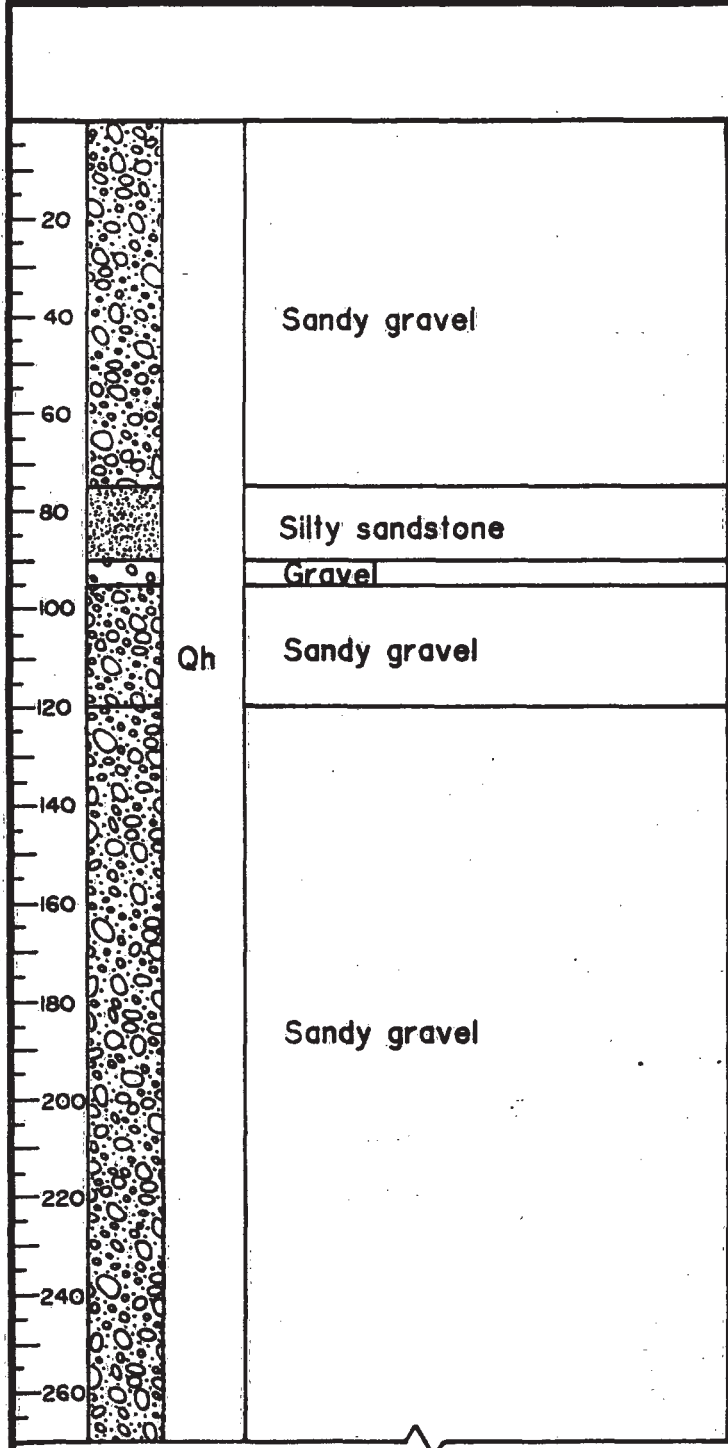
TOP OF CASING ELEV. = 4,574.90
GROUND SURFACE ELEV. = 4,572.85

STRATIGRAPHIC LOG

DP-5

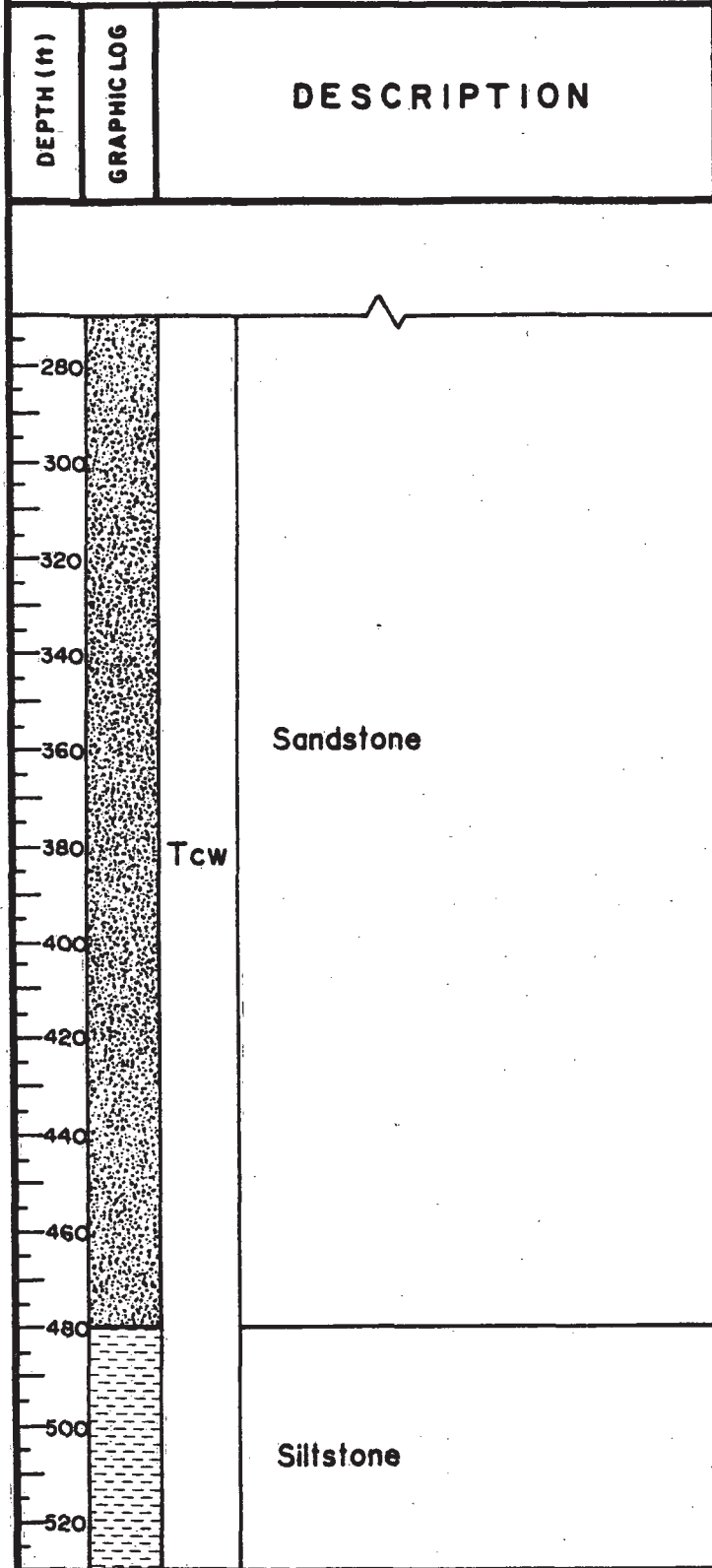
- 0.0'-55.0': Sandy gravel. 70% gravel, 20% sand, 10% cobbles. Gravel, sand and cobbles are quartzite. Silty zones throughout.
- 55.0'-175.0': Siltstone. 5% dark minerals. 5% quartz grains. Partially devitrified vitric ash. Few mica flakes. Friable, soft, thin-bedded, laminated in portions. Grayish brown (2.5YR 5/2).
- 175.0'-190.0': Coarse sand.
- 190.0'-200.0': Claystone.
- 200.0'-220.0': Tuff. Fine grained, with siltstone and sandstone fragments. Sandstone is very fine grained, soft.
- 220.0'-360.0': Gravel. 90% quartzite fragments with minor amounts of sandstone and limestone. Contains reddish brown silty sand matrix.

GEOLOGIC LOG		WELL CONSTRUCTION DETAILS
DEPTH (ft)	GRAPHIC LOG	

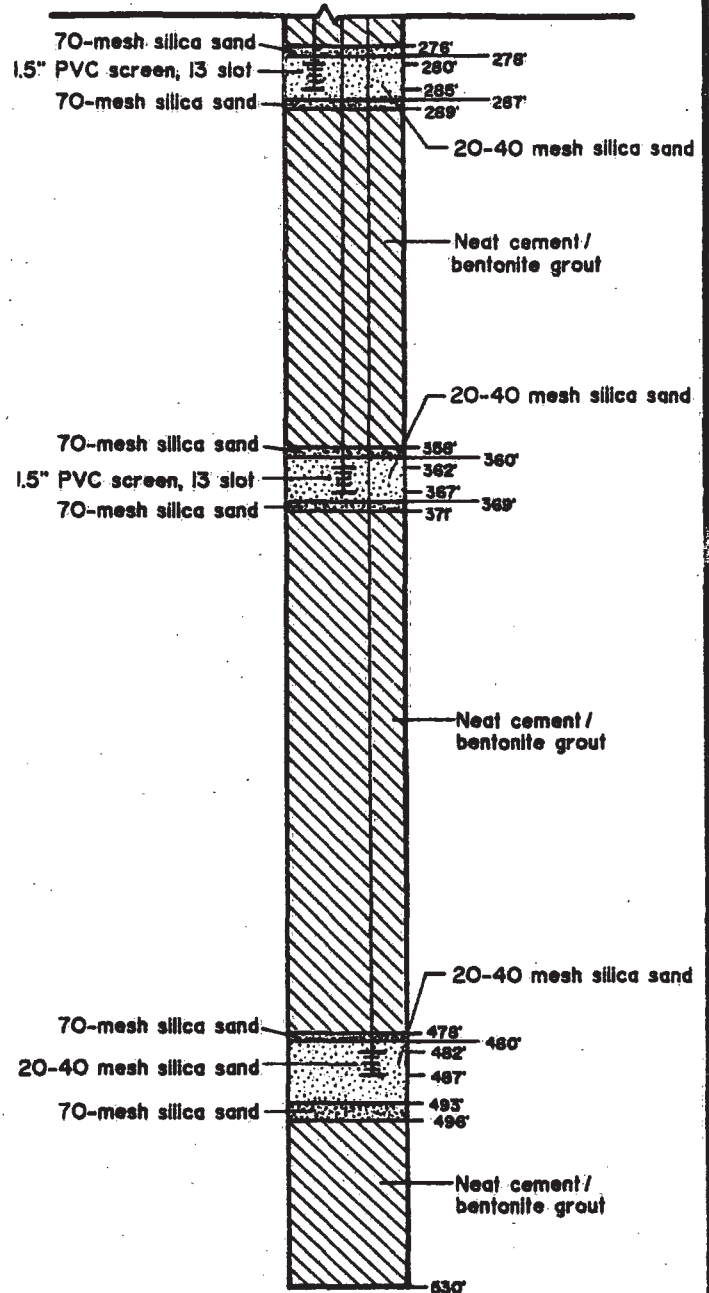


GEOLOGIC LOG

WELL CONSTRUCTION DETAILS



TD=530'



EarthFax
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EarthFax PROJECT No. C-20



HERCULES

BACCHUS
WORKS

DEEP PIEZOMETER DP-6

Pg 2

TOP OF CASING ELEV. = 4,939.69
GROUND SURFACE ELEV. = 4,937.82

STRATIGRAPHIC LOG

DP-6

- 0.0'-75.0': Sandy gravel. 65% quartzite gravel, 35% sand, stringers of silty sand. Gravel is subangular to subrounded. Occasional cobbles. Reddish brown (5YR 5/3).
- 75.0'-90.0': Silty sandstone. Fine grained, soft to very soft, mostly subrounded quartz. Friable. Brown (7.5YR 5/4).
- 90.0'-95.0': Gravel.
- 95.0'-120.0': Sandy gravel. 75% gravel, 25% sand with silty sand lenses. Gravel is 40% quartzite, 40% limestone, 20% andesite-latite. Reddish brown (5YR 5/3).
- 120.0'-170.0': Sandy gravel. Gravel is 40% andesite-latite, 20% calcareous sandstone, 20% limestone, 20% quartzite, trace of chert. Overall sample color darkens with depth.
- 170.0'-270.0': As above, but contains a trace of altered vitric ash in the form of clay balls.
- 270.0'-435.0': Sandstone. Very fine grained, soft, with interbeds of siltstone, and coarse sand. Laminated to thin-bedded. Lenses of claystone, friable, no joints or fractures.
- 435.0'-480.0': As above, but contains marlstone.
- 480.0'-530.0': Siltstone. Fine sand stringers up to 1/8 " thick, laminated, soft, minor amounts of carbonate present throughout. No natural joints or fractures.

TARGET SHEET
EPA REGION VIII
SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 424437

SITE NAME: HERCULES INC/BACCHUS WORKS

DOCUMENT DATE: 11/15/1988

DOCUMENT NOT SCANNED

Due to one of the following reasons:

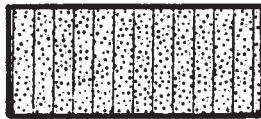
- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☒ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

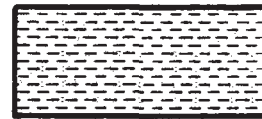
BPB Borehole DP-6 Focuss Electric Log, Dual Space Neutron Log, and
Lithology Log



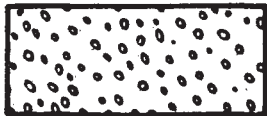
Conglomerate



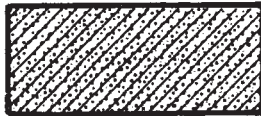
Silty sand



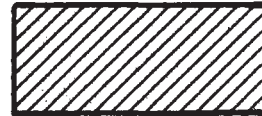
Siltstone / Claystone



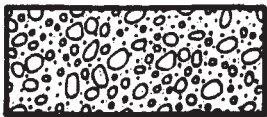
Gravel



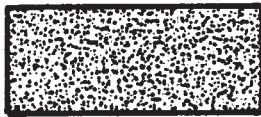
Clayey sand



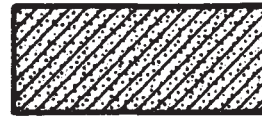
Clay



Sand & gravel



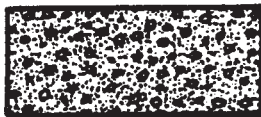
Sandstone



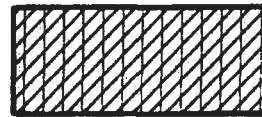
Sandy clay



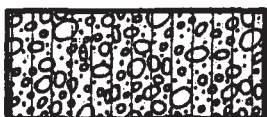
Sandy gravel with clay



Sandstone & gravel



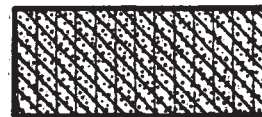
Silty clay



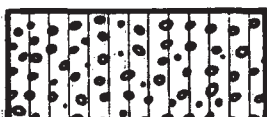
Sandy gravel with silt



Sandstone & all
mud matrix



Sandy silty clay



Silty gravel



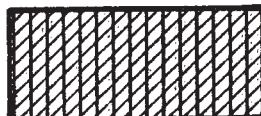
Silt



Tuff



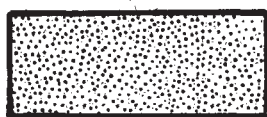
Clay & gravel



Clayey silt



Limestone



Sand



HERCULES

**BACCHUS
WORKS**

GEOLOGIC SYMBOLS

PREPARED BY
EarthFax Engineering Inc.

DATE
11/88

Hercules Aerospace Company
Bacchus Works

Groundwater Quality Assessment
November 15, 1988

APPENDIX D

WATER-LEVEL DATA

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-01

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/10/85	36.03	4635.15
02/08/86	36.40	4634.78
03/18/86	35.97	4635.21
05/27/86	18.50	4652.68
08/05/86	19.95	4651.23
09/03/86	22.35	4648.83
10/06/86	29.56	4641.62
11/03/86	31.68	4639.50
12/08/86	33.28	4637.90
01/12/87	33.81	4637.37
02/22/87	34.43	4636.75
03/16/87	34.66	4636.52
04/28/87	35.22	4635.96
05/27/87	33.65	4637.53
06/18/87	32.39	4638.79
07/23/87	33.81	4637.37
08/13/87	35.00	4636.18
09/23/87	35.09	4636.09
10/28/87	36.06	4635.12
11/30/87	36.46	4634.72
12/22/87	36.51	4634.67
01/28/88	36.61	4634.57
02/18/88	36.69	4634.49
03/21/88	36.80	4634.38
04/21/88	36.75	4634.43
05/26/88	37.07	4634.11
07/07/88	36.69	4634.49
07/21/88	37.03	4634.15

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-02

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	66.82	4652.05
03/17/86	66.67	4652.20
05/27/86	64.31	4654.36
08/05/86	65.02	4653.85
09/03/86	65.21	4653.66
10/06/86	65.45	4653.42
11/03/86	65.65	4653.22
12/08/86	65.94	4652.93
01/12/87	66.15	4652.72
02/22/87	66.46	4652.41
03/16/87	66.62	4652.25
04/28/87	66.79	4652.08
05/27/87	66.55	4652.32
06/18/87	67.66	4651.21
07/23/87	67.04	4651.83
08/13/87	66.88	4651.99
09/23/87	67.16	4651.71
10/28/87	67.29	4651.58
11/30/87	69.69	4649.18
12/22/87	67.88	4650.99
01/28/88	67.88	4650.99
02/18/88	67.93	4650.94
03/21/88	67.83	4651.04
04/21/88	67.93	4650.94
05/26/88	68.83	4650.04
07/07/88	68.54	4650.33
07/21/88	68.72	4650.15

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1983

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-03

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/13/85	69.95	4738.46
01/15/86	70.69	4737.72
02/11/86	70.04	4738.37
03/13/86	69.25	4739.16
05/27/86	54.32	4754.09
08/05/86	55.80	4752.61
09/03/86	62.98	4745.43
10/06/86	64.66	4743.75
11/03/86	65.30	4743.11
12/08/86	65.00	4743.41
01/12/87	65.87	4742.54
02/22/87	66.34	4742.07
03/16/87	66.02	4742.39
04/28/87	66.24	4742.17
05/27/87	63.97	4744.44
06/18/87	64.48	4743.93
07/23/87	65.63	4742.79
08/12/87	66.21	4742.20
09/23/87	66.18	4742.23
10/28/87	66.94	4741.47
11/30/87	66.84	4741.57
12/22/87	66.58	4741.83
01/28/88	64.49	4743.92
02/18/88	63.93	4744.48
03/21/88	63.92	4744.49
04/21/88	64.12	4744.29
05/26/88	65.47	4742.94
07/07/88	66.00	4742.41
07/21/88	65.31	4743.10

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-04

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	62.75	4642.06
02/17/86	63.00	4641.81
03/17/86	62.89	4641.92
05/27/86	53.88	4650.93
08/05/86	49.86	4654.95
09/03/86	53.19	4651.62
10/06/86	58.25	4646.56
11/03/86	59.38	4645.43
12/08/86	60.70	4644.11
01/12/87	61.11	4643.70
02/22/87	61.61	4643.20
03/16/87	61.79	4643.02
04/28/87	61.95	4642.86
05/27/87	61.15	4643.66
06/18/87	60.06	4644.75
07/23/87	60.96	4643.85
08/13/87	61.86	4642.95
09/23/87	62.01	4642.80
10/29/87	62.34	4642.47
11/30/87	62.49	4642.32
12/22/87	62.95	4641.86
01/28/88	62.65	4642.16
02/18/88	62.54	4642.27
03/21/88	62.54	4642.27
04/21/88	62.55	4642.26
05/26/88	62.70	4642.11
07/07/88	62.38	4642.43
07/21/88	62.65	4642.16

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1982

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-05

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/18/85	35.03	4640.74
12/18/85	35.03	4640.74
12/18/85	35.03	4640.74
02/17/86	36.25	4639.52
03/17/86	35.27	4640.50
05/27/86	24.89	4650.88
08/05/86	20.97	4654.80
09/03/86	23.09	4652.68
10/06/86	29.23	4647.54
11/03/86	30.20	4645.57
12/08/86	31.87	4643.90
01/12/87	32.55	4643.22
02/22/87	33.33	4642.44
03/16/87	33.63	4642.14
04/28/87	34.15	4641.62
05/27/87	33.83	4641.94
06/18/87	33.29	4642.48
07/23/87	33.78	4641.99
08/13/87	34.18	4641.59
09/23/87	34.86	4640.91
10/28/87	35.26	4640.51
11/30/87	35.75	4640.02
12/22/87	35.91	4639.86
01/28/88	35.84	4639.93
02/18/88	36.14	4639.63
03/21/88	36.47	4639.30
04/21/88	36.23	4639.54
05/26/88	36.59	4639.18
07/07/88	36.55	4639.22
07/21/88	36.84	4638.93

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-06

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/20/85	68.01	4648.42
03/19/86	68.32	4648.11
05/27/86	57.26	4659.17
08/05/86	54.20	4662.23
09/03/86	57.65	4658.78
10/06/86	62.89	4653.54
11/03/86	63.94	4652.49
12/08/86	65.45	4650.98
01/12/87	66.01	4650.42
02/22/87	66.58	4649.85
03/16/87	66.93	4649.50
04/28/87	67.20	4649.23
05/27/87	65.75	4650.68
06/18/87	64.52	4651.91
07/23/87	65.72	4650.71
08/13/87	66.91	4649.52
09/23/87	67.43	4649.00
10/28/87	67.88	4648.55
11/30/87	68.67	4647.76
12/22/87	68.31	4648.12
01/28/88	68.41	4648.02
02/18/88	68.43	4648.00
03/21/88	68.50	4647.93
04/21/88	68.52	4647.91
05/26/88	68.72	4647.71
07/07/88	68.20	4648.23
07/21/88	68.55	4647.88

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-07

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/20/85	81.01	4659.16
03/17/86	81.16	4659.01
05/27/86	69.80	4670.37
08/05/86	63.85	4676.32
09/03/86	70.50	4669.67
10/06/86	77.25	4662.92
11/03/86	78.19	4661.98
12/08/86	79.30	4660.87
01/12/87	79.57	4660.60
02/22/87	79.88	4660.29
03/16/87	80.16	4660.01
04/28/87	80.63	4659.54
05/27/87	79.92	4660.25
06/18/87	78.23	4661.94
07/23/87	79.12	4661.05
08/13/87	80.00	4660.17
09/23/87	80.25	4659.92
10/28/87	80.67	4659.50
11/30/87	80.71	4659.46
12/22/87	80.86	4659.31
01/28/88	80.98	4659.19
02/18/88	80.95	4659.22
03/21/88	80.95	4659.22
04/21/88	80.87	4659.30
05/26/88	81.34	4658.83
07/07/88	80.62	4659.55
07/21/88	81.09	4659.08

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-08

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/09/85	111.23	4774.44
01/15/86	112.05	4773.62
02/10/86	112.10	4773.57
03/12/86	111.63	4774.04
05/27/86	110.15	4775.52
08/05/86	106.45	4779.22
09/03/86	107.48	4778.19
10/06/86	108.64	4777.03
11/03/86	109.66	4776.01
12/08/86	108.91	4776.76
01/12/87	109.93	4775.74
02/22/87	110.16	4775.51
03/16/87	110.37	4775.30
04/28/87	110.48	4775.19
05/27/87	110.57	4775.10
06/18/87	110.58	4775.09
07/23/87	110.63	4775.04
08/13/87	110.85	4774.82
09/23/87	111.11	4774.56
10/28/87	111.29	4774.38
11/30/87	111.91	4773.76
12/22/87	111.93	4773.84
01/28/88	111.92	4773.75
02/18/88	111.88	4773.79
03/21/88	111.87	4773.80
04/21/88	111.81	4773.86
05/26/88	112.79	4772.88
07/07/88	112.25	4773.42
07/21/88	112.50	4773.17

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1998

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-09

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/12/85	55.98	4680.12
01/16/86	56.61	4679.49
02/11/86	56.75	4679.35
03/13/86	56.22	4679.88
05/27/86	35.94	4700.16
08/05/86	29.25	4706.85
09/03/86	42.72	4693.38
10/07/86	50.91	4685.19
11/03/86	51.98	4684.12
12/08/86	53.51	4682.59
01/12/87	53.83	4682.27
02/22/87	54.41	4681.69
03/16/87	54.72	4681.38
04/28/87	54.76	4681.34
05/27/87	52.49	4683.61
06/18/87	51.64	4684.46
07/23/87	50.49	4685.61
08/12/87	49.34	4686.76
09/23/87	54.91	4681.19
10/28/87	55.34	4680.76
11/30/87	55.57	4680.53
12/22/87	55.72	4680.38
01/28/88	55.89	4680.21
02/19/88	55.93	4680.17
03/21/88	55.80	4680.30
04/21/88	55.85	4680.25
05/26/88	55.94	4680.16
07/07/88	55.57	4680.53
07/21/88	55.90	4680.20

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-10

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/11/85	80.59	4713.90
01/17/86	81.10	4713.39
02/12/86	81.20	4713.29
03/13/86	80.74	4713.75
05/27/86	79.55	4714.94
08/05/86	79.45	4715.04
09/03/86	79.40	4715.09
10/07/86	79.62	4714.87
11/03/86	79.85	4714.64
12/08/86	80.00	4714.49
01/12/87	80.18	4714.31
02/22/87	80.56	4713.93
03/16/87	80.50	4713.99
04/28/87	80.16	4714.33
05/27/87	80.26	4714.23
06/18/87	80.37	4714.12
07/23/87	80.41	4714.08
08/12/87	80.46	4714.03
09/23/87	80.51	4713.98
10/28/87	80.90	4713.59
11/30/87	80.71	4713.78
12/22/87	80.85	4713.64
01/28/88	80.74	4713.75
02/18/88	80.89	4713.60
03/21/88	80.65	4713.84
04/21/88	80.83	4713.66
05/26/88	81.36	4713.13
07/07/88	81.05	4713.44
07/21/88	80.92	4713.57

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-11

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/12/85	55.09	4673.65
01/16/86	55.70	4673.04
02/11/86	55.85	4672.89
03/13/86	55.49	4673.25
05/27/86	37.92	4690.82
08/05/86	29.50	4699.24
09/03/86	40.50	4688.24
10/07/86	49.05	4679.69
11/03/86	50.40	4678.34
12/08/86	51.97	4676.77
01/12/87	52.50	4676.24
02/22/87	53.13	4675.61
03/16/87	53.57	4675.17
04/28/87	53.76	4674.98
05/27/87	52.09	4676.65
06/18/87	51.01	4677.73
07/23/87	50.66	4678.08
08/12/87	50.35	4678.39
09/23/87	54.39	4674.35
10/28/87	54.96	4673.78
11/30/87	55.27	4673.47
12/22/87	55.96	4672.78
01/28/88	55.54	4673.20
02/18/88	55.66	4673.08
03/21/88	55.33	4673.41
04/21/88	55.52	4673.22
05/26/88	55.81	4672.93
07/07/88	55.46	4673.28
07/21/88	55.73	4673.01

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-12

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/11/85	35.08	4765.83
01/17/86	35.59	4765.32
02/12/86	35.75	4765.16
03/14/86	34.73	4766.18
05/27/86	31.33	4769.58
08/05/86	32.35	4768.56
09/03/86	32.67	4768.24
10/06/86	33.41	4767.50
11/03/86	34.05	4766.86
12/08/86	35.41	4765.50
01/12/87	35.11	4765.80
02/22/87	35.44	4765.47
03/16/87	35.60	4765.31
04/28/87	35.40	4765.51
05/27/87	35.39	4765.52
06/18/87	35.44	4765.47
07/23/87	35.59	4765.32
08/12/87	35.71	4765.20
09/23/87	36.23	4764.68
10/28/87	36.79	4764.12
11/30/87	36.87	4764.04
12/22/87	36.92	4763.99
01/28/88	36.78	4764.13
02/18/88	36.99	4763.92
03/21/88	37.00	4763.91
04/21/88	37.08	4763.83
05/26/88	36.85	4764.06
07/07/88	36.51	4764.40
07/21/88	36.86	4764.05

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-13

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
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12/11/85	82.31	4701.96
01/17/86	82.62	4701.65
02/11/86	82.25	4702.02
03/14/86	82.01	4702.26
05/27/86	76.60	4707.67
08/05/86	79.88	4704.39
09/03/86	80.59	4703.68
10/07/86	80.43	4703.84
11/03/86	61.30	4722.97
12/08/86	81.67	4702.60
01/12/87	81.84	4702.43
02/22/87	82.93	4701.34
03/16/87	83.33	4700.94
04/28/87	94.06	4690.21
05/27/87	82.87	4701.40
06/18/87	83.17	4701.10
07/23/87	83.60	4700.67
08/13/87	83.91	4700.36
09/23/87	83.96	4700.31
10/28/87	84.21	4700.06
11/30/87	84.87	4699.40
12/22/87	84.41	4699.86
01/28/88	83.72	4700.55
02/18/88	82.91	4701.36
03/21/88	82.31	4701.96
04/21/88	82.88	4701.39
05/26/88	83.97	4700.30
07/07/88	84.18	4700.09
07/21/88	84.23	4700.04

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-14

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/10/85	20.18	4784.51
01/17/86	20.62	4784.07
02/12/86	20.75	4783.94
03/14/86	18.90	4785.79
05/27/86	14.37	4790.32
08/05/86	16.40	4788.29
09/03/86	16.64	4788.05
10/06/86	17.70	4786.99
11/03/86	18.37	4786.32
12/08/86	19.12	4785.57
01/12/87	19.76	4784.93
02/22/87	19.70	4784.99
03/16/87	19.49	4785.20
04/28/87	19.18	4785.51
05/27/87	19.39	4785.30
06/18/87	19.88	4784.81
07/23/87	20.27	4784.42
08/13/87	20.74	4783.95
09/23/87	21.20	4783.49
10/28/87	21.47	4783.22
11/30/87	21.34	4783.35
12/22/87	21.22	4783.47
01/28/88	21.58	4783.11
02/18/88	21.23	4783.46
03/21/88	22.32	4782.37
04/21/88	23.02	4781.67
05/26/88	22.87	4781.82
07/07/88	23.09	4781.60
07/21/88	23.20	4781.49

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-15

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	80.91	4803.30
03/19/86	81.57	4802.64
05/27/86	78.27	4805.94
08/05/86	75.50	4808.71
09/03/86	76.58	4807.63
10/06/86	78.07	4806.14
11/03/86	78.73	4805.48
12/08/86	79.49	4804.72
01/12/87	80.02	4804.19
02/22/87	80.37	4803.84
03/16/87	80.46	4803.75
04/28/87	80.80	4803.41
05/27/87	81.06	4803.15
06/18/87	81.23	4802.98
07/23/87	81.39	4802.82
08/12/87	81.58	4802.63
09/23/87	81.93	4802.28
10/28/87	82.22	4801.99
11/30/87	82.47	4801.74
12/22/87	82.49	4801.72
01/28/88	82.73	4801.48
02/18/88	82.48	4801.73
03/21/88	82.46	4801.75
04/29/88	83.05	4801.16
05/26/88	83.21	4801.00
07/07/88	83.79	4800.42
07/21/88	83.04	4801.17

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-16

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	78.98	4809.49
03/19/86	80.56	4807.91
05/27/86	78.20	4810.27
08/05/86	73.80	4814.67
09/03/86	74.80	4813.67
10/06/86	76.50	4811.97
11/03/86	77.60	4810.87
12/08/86	78.51	4809.96
01/12/87	79.51	4808.96
02/22/87	80.35	4808.12
03/16/87	80.62	4807.85
04/28/87	81.17	4807.30
05/27/87	81.50	4806.97
06/18/87	81.75	4806.72
07/23/87	82.11	4806.36
08/12/87	82.44	4806.03
09/23/87	83.19	4805.28
10/28/87	83.47	4805.00
11/30/87	83.79	4804.68
12/22/87	83.86	4804.61
01/28/88	84.44	4804.03
02/18/88	84.89	4803.58
03/21/88	84.55	4803.92
04/29/88	85.00	4803.47
05/26/88	85.22	4803.25
07/07/88	85.21	4803.26
07/21/88	85.53	4802.94

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Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-17

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/18/85	100.95	4818.42
03/21/86	100.21	4819.16
05/27/86	98.71	4820.66
08/05/86	98.12	4821.25
09/03/86	98.28	4821.09
10/07/86	98.49	4820.88
11/03/86	98.55	4820.82
12/08/86	98.65	4820.72
01/12/87	98.90	4820.47
02/22/87	98.87	4820.50
03/16/87	98.78	4820.59
04/28/87	99.18	4820.19
05/27/87	99.41	4819.96
06/18/87	99.46	4819.91
07/23/87	99.69	4819.68
08/12/87	99.92	4819.45
09/23/87	100.21	4819.16
10/28/87	100.19	4819.18
11/30/87	100.49	4818.88
12/22/87	101.03	4818.34
01/28/88	101.42	4817.95
02/18/88	101.70	4817.67
03/21/88	101.67	4817.70
04/29/88	102.10	4817.27
05/26/88	102.05	4817.32
07/07/88	102.20	4817.17
07/21/88	102.61	4816.76

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-18

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	73.74	4801.18
03/19/86	73.59	4801.33
05/27/86	70.03	4804.89
08/05/86	67.20	4807.72
09/03/86	68.48	4806.44
10/06/86	69.80	4805.12
11/03/86	70.55	4804.37
12/08/86	71.28	4803.64
01/12/87	71.85	4803.07
02/22/87	73.13	4801.79
03/16/87	72.27	4802.65
04/28/87	75.52	4799.40
05/27/87	72.80	4802.12
06/18/87	72.94	4801.98
07/23/87	72.68	4802.24
08/12/87	72.35	4802.57
09/23/87	73.61	4801.31
10/28/87	73.97	4800.95
11/30/87	74.21	4800.71
12/22/87	74.17	4800.75
01/28/88	74.53	4800.39
02/18/88	74.45	4800.47
03/21/88	74.34	4800.58
04/29/88	74.84	4800.08
05/26/88	78.28	4796.64
07/07/88	74.97	4799.95
07/21/88	75.08	4799.84

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-19A

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	79.44	4806.17
03/19/86	77.89	4807.72
05/27/86	75.74	4809.87
08/05/86	71.78	4813.83
09/03/86	72.73	4812.88
10/06/86	74.19	4811.42
11/03/86	75.23	4810.38
12/08/86	76.24	4809.37
01/12/87	76.97	4808.64
02/22/87	77.72	4807.89
03/16/87	77.88	4807.73
04/28/87	78.44	4807.17
05/27/87	78.63	4806.98
06/18/87	78.92	4806.69
07/23/87	79.81	4805.80
08/12/87	79.68	4805.93
09/23/87	79.98	4805.63
10/28/87	80.59	4805.02
11/30/87	80.80	4804.81
12/22/87	81.13	4804.48
01/28/88	81.51	4804.10
02/18/88	81.39	4804.22
03/21/88	81.57	4804.04
04/29/88	81.98	4803.63
05/26/88	82.16	4803.45
07/07/88	82.06	4803.55
07/21/88	82.34	4803.27

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-20

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/16/85	21.65	4872.60
03/18/86	17.02	4877.23
05/27/86	12.77	4881.48
08/05/86	17.20	4877.05
09/03/86	18.30	4875.95
10/07/86	18.66	4875.59
11/03/86	19.30	4874.95
12/08/86	18.86	4875.39
01/12/87	19.37	4874.88
02/22/87	18.06	4876.19
03/16/87	17.55	4876.70
04/28/87	18.18	4876.07
05/27/87	17.85	4876.40
06/18/87	18.43	4875.82
07/23/87	19.28	4874.97
08/12/87	20.12	4874.13
09/23/87	20.61	4873.64
10/28/87	20.53	4873.72
11/30/87	20.84	4873.41
12/22/87	20.75	4873.50
01/28/88	20.57	4873.68
02/18/88	20.07	4874.18
03/21/88	19.00	4875.25
04/29/88	18.69	4875.56
05/26/88	21.81	4872.44
07/07/88	24.39	4869.86
07/21/88	25.03	4869.22

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-21

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	17.50	4875.82
03/18/86	12.65	4880.67
05/27/86	11.72	4881.60
08/05/86	15.00	4878.32
09/03/86	15.05	4878.27
10/07/86	15.37	4877.95
11/03/86	14.77	4878.55
12/08/86	14.03	4879.29
01/12/87	13.96	4879.36
02/22/87	12.05	4881.27
03/16/87	11.83	4881.49
04/28/87	13.01	4880.31
05/27/87	12.63	4880.69
06/18/87	13.33	4879.99
07/23/87	14.05	4879.27
08/12/87	14.81	4878.51
09/23/87	14.65	4878.67
10/28/87	14.00	4879.32
11/30/87	13.78	4879.54
12/22/87	13.51	4879.81
01/28/88	12.54	4880.78
02/18/88	11.14	4882.18
03/21/88	11.30	4882.02
04/29/88	14.09	4879.23
05/26/88	19.76	4873.56
07/07/88	22.34	4870.98
07/21/88	23.04	4870.28

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-22

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/16/85	31.96	4880.35
03/19/86	30.04	4882.17
05/27/86	24.90	4887.31
08/05/86	29.00	4883.21
09/03/86	30.15	4882.06
10/07/86	30.62	4881.59
11/03/86	31.12	4881.09
12/08/86	30.93	4881.28
01/12/87	31.58	4880.63
02/22/87	31.07	4881.14
03/16/87	30.72	4881.49
04/28/87	31.00	4881.21
05/27/87	31.34	4880.87
06/18/87	31.47	4880.74
07/23/87	31.97	4880.24
08/12/87	32.57	4879.64
09/23/87	33.12	4879.09
10/28/87	33.41	4878.80
11/30/87	33.97	4878.24
12/22/87	33.67	4878.54
01/28/88	33.58	4878.63
02/18/88	33.41	4878.80
03/21/88	33.00	4879.21
04/29/88	32.14	4880.07
05/26/88	33.16	4879.05
07/07/88	34.11	4878.10
07/21/88	34.61	4877.60

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-23

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/17/85	82.21	4822.85
03/20/86	83.24	4821.82
05/27/86	79.76	4825.30
08/05/86	76.60	4828.46
09/03/86	77.93	4827.13
10/07/86	79.11	4825.95
11/03/86	79.93	4825.13
12/08/86	80.66	4824.40
01/12/87	81.12	4823.94
02/22/87	81.68	4823.38
03/16/87	81.89	4823.17
04/28/87	82.00	4823.06
05/27/87	82.32	4822.74
06/18/87	82.36	4822.70
07/23/87	82.65	4822.41
08/13/87	82.98	4822.08
09/23/87	83.01	4822.05
10/28/87	83.15	4821.91
11/30/87	83.84	4821.22
12/22/87	83.81	4821.25
01/28/88	83.91	4821.15
02/18/88	84.19	4820.87
03/21/88	83.94	4821.12
04/29/88	84.17	4820.89
05/26/88	84.79	4820.27
07/07/88	84.64	4820.42
07/21/88	84.70	4820.36

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-24

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/18/85	90.67	4801.30
03/19/86	89.10	4802.87
05/27/86	87.11	4804.86
08/05/86	86.70	4805.27
09/03/86	86.95	4805.02
10/07/86	87.19	4804.78
11/03/86	87.49	4804.48
12/08/86	86.83	4805.14
01/12/87	88.07	4803.90
02/22/87	87.93	4804.04
03/16/87	87.96	4804.01
04/28/87	88.30	4803.67
05/27/87	88.59	4803.38
06/18/87	88.55	4803.42
07/23/87	88.60	4803.37
08/12/87	88.64	4803.33
09/23/87	89.00	4802.97
10/28/87	89.48	4802.49
11/30/87	90.17	4801.80
12/22/87	90.96	4801.01
01/28/88	91.34	4800.63
02/18/88	91.76	4800.21
03/21/88	91.89	4800.08
04/29/88	92.75	4799.22
05/26/88	93.06	4798.91
07/07/88	93.17	4798.80
07/21/88	93.34	4798.63

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-25

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/18/85	106.16	4786.16
03/20/86	105.56	4786.76
05/27/86	104.24	4788.08
08/05/86	103.50	4788.82
09/03/86	103.59	4788.73
10/07/86	103.83	4788.49
11/03/86	103.95	4788.37
12/08/86	104.23	4788.09
01/12/87	104.28	4788.04
02/22/87	104.19	4788.13
03/16/87	103.94	4788.38
04/28/87	104.46	4787.86
05/27/87	104.45	4787.87
06/18/87	104.60	4787.72
07/23/87	104.61	4787.71
08/12/87	104.72	4787.60
09/23/87	105.31	4787.01
10/28/87	105.36	4786.96
11/30/87	105.94	4786.38
12/22/87	106.39	4785.93
01/28/88	106.44	4785.88
02/19/88	106.84	4785.48
03/21/88	106.92	4785.40
04/29/88	107.26	4785.06
05/26/88	107.41	4784.91
07/07/88	107.36	4784.96
07/21/88	107.67	4784.65

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-26

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/13/85	102.25	4718.52
01/23/86	104.70	4716.07
02/13/86	103.45	4717.32
03/20/86	102.70	4718.07
05/27/86	102.29	4718.48
08/05/86	101.30	4719.47
09/03/86	101.13	4719.64
10/06/86	101.05	4719.72
11/03/86	101.13	4719.64
12/08/86	101.36	4719.41
01/12/87	101.35	4719.42
02/22/87	101.55	4719.22
03/16/87	101.48	4719.29
04/28/87	101.75	4719.02
05/27/87	101.91	4718.86
06/18/87	101.97	4718.80
07/23/87	102.05	4718.72
08/13/87	102.19	4718.58
09/23/87	102.33	4718.44
10/28/87	102.57	4718.20
11/30/87	102.72	4718.05
12/22/87	103.66	4717.11
01/28/88	103.12	4717.65
02/18/88	102.89	4717.88
03/21/88	111.04	4709.73
05/03/88	103.36	4717.41
05/26/88	103.13	4717.64
07/07/88	103.20	4717.57
07/21/88	103.34	4717.43

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-27

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/13/85	67.90	4785.19
01/24/86	68.80	4784.29
02/13/86	69.05	4784.04
03/21/86	69.37	4783.72
05/27/86	69.30	4783.79
08/05/86	67.88	4785.21
09/03/86	67.48	4785.61
10/06/86	67.30	4785.79
11/03/86	67.45	4785.64
12/08/86	67.95	4785.14
01/12/87	68.32	4784.77
02/22/87	68.83	4784.26
03/16/87	69.07	4784.02
04/28/87	69.74	4783.35
05/27/87	70.15	4782.94
06/18/87	70.45	4782.64
07/23/87	71.82	4781.27
08/13/87	71.22	4781.87
09/23/87	71.76	4781.33
10/28/87	71.98	4781.11
11/30/87	72.69	4780.40
12/22/87	73.12	4779.97
01/28/88	73.12	4779.97
02/18/88	73.62	4779.47
03/21/88	83.43	4769.66
05/03/88	74.69	4778.40
05/26/88	74.93	4778.16
07/07/88	75.31	4777.78
07/21/88	75.54	4777.55

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1998

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-28

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
12/14/85	95.32	4723.76
01/23/86	95.80	4723.28
02/13/86	95.90	4723.18
03/21/86	95.51	4723.57
05/27/86	94.76	4724.32
08/05/86	94.20	4724.88
09/03/86	94.15	4724.93
10/06/86	94.21	4724.87
11/03/86	94.28	4724.80
12/08/86	94.45	4724.63
01/12/87	94.54	4724.54
02/22/87	94.62	4724.46
03/16/87	94.63	4724.45
04/28/87	94.72	4724.36
05/27/87	94.84	4724.24
06/18/87	94.98	4724.10
07/23/87	94.98	4724.10
08/13/87	95.00	4724.08
09/23/87	95.10	4723.98
10/28/87	95.29	4723.79
11/30/87	95.52	4723.56
12/22/87	95.54	4723.54
01/28/88	95.27	4723.81
02/18/88	95.57	4723.51
03/21/88	103.26	4715.82
05/03/88	95.87	4723.21
05/26/88	95.91	4723.17
07/07/88	95.61	4723.47
07/21/88	95.77	4723.31

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-29

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/14/85	81.01	4738.21
01/24/86	81.50	4737.72
02/14/86	81.53	4737.69
03/25/86	81.39	4737.83
05/27/86	79.87	4739.35
08/05/86	79.35	4739.87
09/03/86	79.44	4739.78
10/06/86	79.58	4739.64
11/03/86	79.70	4739.52
12/08/86	80.00	4739.22
01/12/87	80.32	4738.90
02/22/87	80.52	4738.70
03/16/87	80.56	4738.66
04/28/87	81.13	4738.09
05/27/87	81.40	4737.82
06/18/87	81.42	4737.80
07/23/87	81.59	4737.63
08/13/87	81.87	4737.35
09/23/87	82.29	4736.93
10/28/87	82.44	4736.78
11/30/87	83.06	4736.16
12/22/87	83.39	4735.83
01/28/88	83.57	4735.65
02/18/88	83.74	4735.48
03/21/88	90.68	4728.54
05/03/88	84.56	4734.66
05/26/88	84.79	4734.43
07/07/88	84.87	4734.35
07/21/88	85.10	4734.12

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-30

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/20/85	192.53	4470.35
03/21/86	193.55	4469.33
05/28/86	193.66	4469.22
08/05/86	192.22	4470.66
09/03/86	191.34	4471.54
10/06/86	190.10	4472.78
11/03/86	189.63	4473.25
12/08/86	189.04	4473.84
01/12/87	189.30	4473.58
02/22/87	189.80	4473.08
03/16/87	190.52	4472.36
04/28/87	192.12	4470.76
05/27/87	191.50	4471.38
06/18/87	191.84	4471.04
07/23/87	191.20	4471.68
08/12/87	192.64	4470.24
09/23/87	193.41	4469.47
10/28/87	194.06	4468.82
11/30/87	194.82	4468.06
12/22/87	195.44	4467.44
01/28/88	195.88	4467.00
02/18/88	196.49	4466.39
03/21/88	196.25	4466.63
05/03/88	197.85	4465.03
05/26/88	198.09	4464.79
07/07/88	198.52	4464.36
07/21/88	198.79	4464.09

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-31

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/20/85	197.28	4475.25
03/21/86	198.46	4474.07
05/28/86	198.35	4474.18
08/05/86	196.84	4475.69
09/03/86	196.70	4475.83
10/06/86	194.83	4477.70
11/03/86	194.37	4478.16
12/08/86	194.17	4478.36
01/12/87	194.31	4478.22
02/22/87	196.01	4476.52
03/16/87	195.63	4476.90
04/28/87	195.88	4476.65
05/27/87	196.46	4476.07
06/18/87	196.80	4475.73
07/23/87	196.24	4476.29
08/12/87	197.12	4475.41
09/23/87	198.02	4474.51
10/28/87	190.80	4481.73
11/30/87	199.67	4472.86
12/22/87	199.91	4472.62
01/28/88	200.21	4472.32
02/18/88	200.87	4471.66
03/21/88	200.60	4471.93
05/03/88	202.07	4470.46
05/26/88	202.27	4470.26
07/07/88	202.28	4470.25
07/21/88	202.53	4470.00

Hercules Aerospace Company
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-32

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/18/85	140.97	4469.09
03/25/86	140.42	4469.64
05/28/86	139.48	4470.58
08/05/86	138.40	4471.66
09/03/86	138.12	4471.94
10/06/86	137.98	4472.08
11/03/86	137.95	4472.11
12/08/86	137.95	4472.11
01/12/87	137.79	4472.27
02/22/87	137.82	4472.24
03/16/87	137.97	4472.09
04/28/87	137.62	4472.44
05/27/87	137.76	4472.30
06/18/87	137.80	4472.26
07/23/87	137.99	4472.07
08/12/87	138.14	4471.92
09/23/87	139.51	4470.55
10/28/87	138.74	4471.32
11/30/87	139.35	4470.71
12/22/87	139.37	4470.69
01/28/88	193.99	4416.07
02/18/88	140.03	4470.03
03/21/88	139.79	4470.27
05/03/88	140.65	4469.41
05/26/88	140.93	4469.13
07/08/88	141.05	4469.01
07/21/88	141.45	4468.61

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-33

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
12/19/85	158.51	4440.42
03/26/86	158.71	4440.22
05/28/86	158.26	4440.67
08/05/86	156.97	4441.96
09/03/86	156.45	4442.48
10/06/86	155.92	4443.01
11/03/86	155.66	4443.27
12/08/86	155.45	4443.48
01/12/87	155.37	4443.56
02/22/87	155.39	4443.54
03/16/87	155.64	4443.29
04/28/87	155.57	4443.36
05/27/87	155.31	4443.62
06/18/87	155.91	4443.02
09/23/87	156.91	4442.02
11/30/87	158.12	4440.81
12/22/87	157.85	4441.08
01/28/88	159.00	4439.93
02/18/88	159.74	4439.19
03/21/88	161.35	4437.58
05/03/88	162.24	4436.69
05/26/88	162.21	4436.72
07/08/88	161.41	4437.52
07/21/88	161.51	4437.42

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-34

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
12/20/85	170.18	4417.56
03/26/86	171.01	4416.73
05/28/86	171.17	4416.57
08/05/86	170.40	4417.34
09/03/86	169.90	4417.84
10/06/86	169.12	4418.62
11/03/86	168.71	4419.03
12/08/86	168.42	4419.32
01/12/87	168.33	4419.41
02/22/87	168.37	4419.37
03/16/87	168.93	4418.81
04/28/87	169.18	4418.56
05/27/87	169.58	4418.16
06/18/87	169.90	4417.84
07/23/87	170.06	4417.68
08/12/87	170.22	4417.52
09/23/87	170.80	4416.94
10/28/87	171.29	4416.45
11/30/87	172.14	4415.60
12/22/87	172.10	4415.64
01/28/88	172.92	4414.82
02/18/88	173.53	4414.21
03/21/88	173.35	4414.39
05/03/88	175.17	4412.57
05/26/88	175.18	4412.56
07/08/88	175.44	4412.30
07/21/88	175.83	4411.91

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-35

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	155.72	4431.48
03/21/86	157.23	4430.17
05/28/86	156.68	4430.72
08/05/86	155.70	4431.70
09/03/86	155.14	4432.26
10/06/86	154.49	4432.91
11/03/86	154.02	4433.38
12/08/86	154.44	4432.96
01/12/87	153.47	4433.93
02/22/87	153.61	4433.79
03/16/87	154.90	4432.50
04/28/87	154.28	4433.12
05/27/87	154.70	4432.70
06/18/87	154.95	4432.45
07/23/87	155.30	4432.10
08/12/87	155.45	4431.95
09/23/87	156.04	4431.36
10/28/87	156.57	4430.83
11/30/87	157.42	4429.98
12/22/87	157.37	4430.03
01/28/88	157.08	4430.32
02/18/88	158.68	4428.72
03/05/88	160.24	4427.16
03/21/88	158.56	4428.84
05/03/88	160.24	4427.16
05/26/88	160.19	4427.21
07/08/88	160.50	4426.90
07/21/88	160.69	4426.71

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-36

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/20/85	164.60	4419.31
03/24/86	165.88	4418.03
05/28/86	166.00	4417.91
08/05/86	165.17	4418.74
09/03/86	164.61	4419.30
10/06/86	163.88	4420.03
11/03/86	163.45	4420.46
12/08/86	163.15	4420.76
01/12/87	162.96	4420.95
02/22/87	163.08	4420.83
03/16/87	163.84	4420.07
04/28/87	163.83	4420.08
05/27/87	164.30	4419.61
06/18/87	164.53	4419.38
07/23/87	164.78	4419.13
08/12/87	165.03	4418.88
09/23/87	165.57	4418.34
10/28/87	166.03	4417.98
11/30/87	167.85	4416.06
12/22/87	166.95	4416.96
01/28/88	167.69	4416.22
02/18/88	168.25	4415.66
03/05/88	169.73	4414.18
03/21/88	168.43	4415.48
05/03/88	169.73	4414.18
05/26/88	170.05	4413.86
07/08/88	170.45	4413.46
07/21/88	170.64	4413.27

Hercules Aerospace Company
Bacchus Works

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-37

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	28.42	4549.22
03/24/86	27.15	4550.49
05/28/86	26.01	4551.63
08/05/86	27.92	4549.72
09/03/86	27.92	4549.72
10/06/86	27.31	4550.33
11/03/86	27.63	4550.01
12/08/86	26.97	4550.67
01/12/87	27.28	4550.36
02/22/87	25.60	4552.04
03/16/87	25.05	4552.59
04/28/87	26.45	4551.19
05/27/87	26.76	4550.88
06/18/87	27.56	4550.08
07/23/87	28.29	4549.35
08/12/87	29.08	4548.56
09/23/87	29.87	4547.77
10/28/87	30.55	4547.09
11/30/87	29.31	4548.33
12/22/87	29.22	4548.42
01/28/88	30.33	4547.31
02/18/88	29.63	4548.01
03/21/88	28.67	4548.97
04/29/88	27.54	4550.10
05/26/88	27.54	4550.10
07/08/88	29.41	4548.23
07/20/88	29.86	4547.78

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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-38

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	39.11	4538.92
03/24/86	38.41	4539.62
05/28/86	35.77	4542.26
08/05/86	37.95	4540.08
09/03/86	38.38	4539.65
10/06/86	37.77	4540.26
11/03/86	38.44	4539.59
12/08/86	38.35	4539.68
01/12/87	38.30	4539.73
02/22/87	37.89	4540.14
03/16/87	37.93	4540.10
04/28/87	39.41	4539.62
05/27/87	37.59	4540.44
06/18/87	37.88	4540.15
07/23/87	37.22	4540.81
08/12/87	36.55	4541.48
09/23/87	35.24	4542.79
10/28/87	35.29	4542.74
11/30/87	37.82	4540.21
12/22/87	38.04	4539.99
01/28/88	37.77	4540.26
02/18/88	37.10	4540.93
03/21/88	36.28	4541.75
04/29/88	37.42	4540.61
05/26/88	38.25	4539.78
07/08/88	37.89	4540.14
07/20/88	38.15	4539.88

Hercules Aerospace Company
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-39

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	36.63	4589.45
03/24/86	35.98	4590.10
05/28/86	32.09	4593.99
08/05/86	33.85	4592.23
09/03/86	35.14	4590.94
10/06/86	35.56	4590.52
11/03/86	35.75	4590.33
12/08/86	35.31	4590.77
01/12/87	35.53	4590.55
02/22/87	35.26	4590.82
03/16/87	35.33	4590.75
04/28/87	35.70	4590.38
05/27/87	35.84	4590.24
06/18/87	36.46	4589.62
07/23/87	37.05	4589.03
08/12/87	37.88	4588.20
09/23/87	38.72	4587.36
10/28/87	38.79	4587.29
11/30/87	38.94	4587.14
12/22/87	38.35	4587.73
01/28/88	38.24	4587.84
02/18/88	37.72	4588.36
03/21/88	37.16	4588.92
04/29/88	37.48	4588.60
05/26/88	38.02	4588.06
07/08/88	39.15	4586.93
07/20/88	39.89	4586.19

Hercules Aerospace Company
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-40

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	24.11	4551.44
03/24/86	23.37	4552.18
05/28/86	23.28	4552.27
08/05/86	25.00	4550.55
09/03/86	25.69	4549.86
10/06/86	25.56	4549.99
11/03/86	27.11	4548.44
12/08/86	25.16	4550.39
01/12/87	24.52	4551.03
02/22/87	24.89	4550.66
03/16/87	26.07	4549.48
04/28/87	28.40	4547.15
05/27/87	25.46	4550.09
06/18/87	24.20	4551.35
07/23/87	24.38	4551.17
08/12/87	24.57	4550.98
09/23/87	24.96	4550.59
10/28/87	25.37	4550.18
11/30/87	25.81	4549.74
12/22/87	25.83	4549.72
01/28/88	26.80	4548.75
02/18/88	26.89	4548.66
03/21/88	26.06	4549.49
04/29/88	25.94	4549.61
05/26/88	27.20	4548.35
07/08/88	24.66	4550.89
07/20/88	24.96	4550.59

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-41

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	44.77	4555.03
03/24/86	44.71	4555.09
05/28/86	40.42	4559.38
08/05/86	42.00	4557.80
09/03/86	42.76	4557.04
10/06/86	43.48	4556.32
11/03/86	44.08	4555.72
12/08/86	44.53	4555.27
01/12/87	45.13	4554.67
02/22/87	45.22	4554.58
03/16/87	45.59	4554.21
04/28/87	46.37	4553.43
05/27/87	46.40	4553.40
06/18/87	46.51	4553.29
07/23/87	46.33	4553.47
08/12/87	46.13	4553.67
09/23/87	46.69	4553.11
10/28/87	46.34	4553.46
11/30/87	46.92	4552.88
12/22/87	46.89	4552.91
01/28/88	47.15	4552.65
02/18/88	47.47	4552.33
03/21/88	47.22	4552.58
04/29/88	47.86	4551.94
05/26/88	47.74	4552.06
07/08/88	47.81	4551.99
07/20/88	47.98	4551.82

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Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-42

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
12/19/85	31.93	4547.62
03/24/86	34.81	4544.74
05/28/86	32.91	4546.64
08/05/86	33.30	4546.25
09/03/86	33.75	4545.80
10/06/86	34.04	4545.51
11/03/86	34.57	4544.98
12/08/86	34.43	4545.12
01/12/87	35.73	4543.82
02/22/87	35.71	4543.84
03/16/87	37.24	4542.31
04/28/87	38.02	4541.53
05/27/87	33.70	4545.85
06/18/87	29.72	4549.83
07/23/87	30.11	4549.44
08/12/87	30.57	4548.98
09/23/87	32.15	4547.40
10/28/87	32.45	4547.10
11/30/87	32.70	4546.85
12/22/87	33.21	4546.34
01/28/88	33.89	4545.66
02/18/88	33.83	4545.72
03/21/88	33.08	4546.47
04/29/88	34.25	4545.30
05/26/88	35.47	4544.08
07/08/88	33.10	4546.45
07/20/88	33.74	4545.81

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-43

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	32.59	4784.80
10/28/87	33.62	4783.77
11/30/87	33.26	4784.13
12/22/87	33.21	4784.18
01/28/88	34.30	4783.09
02/18/88	32.91	4784.48
03/21/88	33.58	4783.81
04/21/88	33.59	4783.80
05/26/88	33.42	4783.97
07/08/88	33.05	4784.34
07/21/88	33.04	4784.35

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-44

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	100.18	4799.48
10/28/87	100.16	4799.50
11/30/87	100.33	4799.33
12/22/87	100.15	4799.51
01/28/88	100.49	4799.17
02/18/88	100.33	4799.33
03/21/88	100.12	4799.54
04/29/88	100.34	4799.32
05/26/88	100.18	4799.48
07/08/88	99.86	4799.80
07/21/88	99.88	4799.78

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-45

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	21.39	4727.21
10/28/87	22.22	4726.38
11/30/87	22.15	4726.45
12/22/87	22.15	4726.45
01/28/88	21.32	4727.28
02/18/88	19.90	4728.70
03/21/88	18.62	4729.98
04/21/88	17.56	4731.04
05/26/88	17.53	4731.07
07/08/88	21.21	4727.39
07/21/88	21.96	4726.64

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-46

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	48.80	4650.90
10/28/87	50.17	4649.53
11/30/87	50.19	4649.51
12/22/87	50.38	4649.32
01/28/88	50.16	4649.54
02/18/88	49.43	4650.27
03/21/88	48.39	4651.31
04/21/88	46.93	4652.77
05/26/88	46.74	4652.96
07/08/88	48.55	4651.15
07/21/88	49.68	4650.02

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Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-47

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	107.19	4692.03
10/28/87	107.58	4691.64
11/30/87	108.06	4691.16
12/22/87	108.08	4691.14
01/28/88	108.16	4691.06
02/18/88	108.45	4690.77
03/21/88	108.26	4690.96
05/03/88	109.18	4690.04
05/26/88	109.19	4690.03
07/08/88	109.20	4690.02
07/21/88	109.52	4689.70

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-48

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	155.39	4574.28
10/28/87	155.94	4573.73
11/30/87	156.07	4573.60
12/22/87	156.25	4573.42
01/28/88	156.33	4573.34
02/18/88	156.66	4573.01
03/21/88	156.34	4573.33
05/03/88	157.16	4572.51
05/26/88	157.31	4572.36
07/08/88	157.32	4572.35
07/21/88	157.56	4572.11

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Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-49

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	50.87	4747.95
10/28/87	51.35	4747.47
11/30/87	51.54	4747.28
12/22/87	51.54	4747.28
01/28/88	51.84	4746.98
02/18/88	52.14	4746.68
03/21/88	60.39	4738.43
05/03/88	52.54	4746.28
05/26/88	52.83	4745.99
07/08/88	52.54	4746.28
07/21/88	52.70	4746.12

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Groundwater Elevations
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HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-50

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
09/23/87	25.97	4766.11
10/28/87	26.38	4765.70
11/30/87	26.16	4765.92
12/22/87	26.61	4765.47
01/28/88	26.18	4765.90
02/18/88	25.35	4766.73
03/21/88	32.59	4759.49
04/21/88	23.95	4768.13
05/26/88	24.92	4767.16
07/08/88	25.91	4766.17
07/21/88	26.54	4765.54

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Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-51

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
02/18/88	181.42	4523.43
03/21/88	181.15	4523.70
05/03/88	181.97	4522.88
05/26/88	182.23	4522.62
07/08/88	182.19	4522.66
07/21/88	181.70	4523.15

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Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-52

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
02/18/88	242.10	4327.72
03/21/88	241.58	4328.24
04/29/88	242.45	4327.37
05/26/88	242.22	4327.60
07/08/88	242.05	4327.77
07/20/88	242.46	4327.36

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Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-53

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
02/18/88	153.80	4406.83
03/21/88	153.35	4407.28
04/29/88	154.04	4406.59
05/26/88	153.80	4406.83
07/08/88	152.66	4407.97
07/20/88	153.80	4406.83

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Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-54

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
02/18/88	148.71	4408.11
03/21/88	148.53	4408.29
04/29/88	149.56	4407.26
05/26/88	149.78	4407.04
07/08/88	150.16	4406.66
07/20/88	150.43	4406.39

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Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-55

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
02/18/88	64.38	4630.25
03/21/88	63.95	4630.68
05/03/88	64.67	4629.96
05/26/88	64.98	4629.65
07/08/88	64.85	4629.78
07/20/88	65.04	4629.59

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Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-56

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
02/18/88	145.02	4404.22
03/21/88	145.41	4403.83
04/29/88	146.61	4402.63
05/26/88	146.58	4402.66
07/08/88	146.79	4402.45
07/20/88	146.92	4402.32

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Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-57

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
02/18/88	104.22	4435.75
03/21/88	104.36	4435.61
04/29/88	105.25	4434.72
05/26/88	105.09	4434.88
07/08/88	105.67	4434.30
07/20/88	105.55	4434.42

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Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-58

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
02/18/88	195.78	4773.86
03/21/88	194.49	4775.15
04/29/88	194.18	4775.46
05/26/88	193.36	4776.28
07/08/88	192.66	4776.98
07/21/88	192.45	4777.19

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-59

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
09/23/87	199.06	4708.02
10/28/87	199.50	4707.58
11/30/87	199.98	4707.10
12/22/87	200.24	4706.84
01/28/88	195.72	4711.36
02/18/88	196.60	4710.48
03/21/88	206.99	4700.09
04/29/88	201.74	4705.34
05/26/88	201.84	4705.24
07/08/88	201.55	4705.53
07/21/88	201.63	4705.45

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Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-60

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
-----	-----	-----
01/28/88	172.56	4688.41
02/18/88	172.65	4688.32
03/21/88	175.26	4685.71
04/29/88	172.29	4688.68
05/26/88	170.96	4690.01
07/08/88	170.14	4690.83
07/21/88	170.21	4690.76

Hercules Aerospace Company
Bacchus Works

Groundwater Elevations
10 November 1988

HERCULES BACCHUS WORKS
HISTORICAL WATER-LEVEL
DATA FOR GW-61

Date	Depth (ft. BTC)	Elev. of SWL (ft. above MSL)
11/30/87	114.36	4769.93
12/22/87	114.55	4769.74
01/28/88	114.01	4770.28
02/18/88	113.91	4770.38
03/21/88	119.18	4765.11
04/29/88	113.20	4771.09
05/26/88	112.08	4772.21
07/08/88	111.78	4772.51
07/21/88	111.66	4772.63

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Groundwater Quality Assessment
November 15, 1988

APPENDIX E

LABORATORY PHYSICAL ANALYSES OF
CORE AND SHELBY TUBE SAMPLES

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTH FAX ENG.
 Job # 5461-022-3071
 Location _____
 Boring # DP-1
 Sample # _____
 Depth 30.65 - 31.20
 Deflecting Speed 0 in/Hr
 Lateral Pressure 3024 PSF 2024 PSI
 Saturated ☒ Field Moisture ☐
 Set-Up 5/10/67 Tested EEK (Office)
 Soil Type LIMESTONE

	Initial	Final
Weight soil & dish no. <u>457</u>		<u>249.4</u>
Dry weight soil & dish		<u>212.4</u>
Net loss of moisture		
Weight of dish only		<u>16.7</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>13.5</u>	<u>15.4</u>

Wt. solids + moisture	W_0 <u>228.9</u>	<u>232.5</u> gms.
$W_0 \div 454$	W_0'	lbs.
Weight solids	W_s <u>201.7</u>	gms.
Wet density $W_0' \div V_0'$	<u>132.0</u>	<u>135.1</u> pcf
Dry density	<u>116.3</u>	<u>117.1</u> pcf

Net diameter	D_0 <u>2.05</u>	in.
Area $(0.785 D_0^2)$ <u>2.06</u> <u>2.04</u>	A_0 <u>3.299</u>	<u>3.28</u> sq. in.
Height <u>2.05</u>	H_0 <u>2.00</u>	in.
Volume $(A_0 H_0) \div 1728$	V_0'	cu. ft.
Volume $(A_0 H_0) \times 16.4$	V_0 <u>108.21</u>	cc
Specific gravity of solids	G_s <u>2.6</u>	
Volume of solids $W_s \div G_s$	V_s <u>77.55</u>	cc
$(V_0 - V_s) \div V_s$	e_1	
Initial burette reading		cc
Burette reading under pressure		cc
$(V_p - V_s) \div V_s$	e_p	

$$(1 - V_s/V_0) \text{ Porosity} = .283$$

$$K = 6.39 \times 10^{-9} \text{ cm/sec}$$

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTH FAX
 Job # 5461-022-8071
 Location _____
 Boring # DP-1
 Sample # _____
 Depth 78.7 - 79.3
 Deflecting Speed 0 in/Hr
 Lateral Pressure 806.4 PSF
 Saturated ☒ Field Moisture ☐
 Set-Up 5/19/87 Tested EEK (47 Office)
 Soil Type SILTSTONE

	Initial	Final
Weight soil & dish no. 454		<u>202.2</u>
Dry weight soil & dish		<u>146.9</u>
Net loss of moisture		
Weight of dish only		<u>16.8</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>32.1</u>	<u>42.5</u>
<hr/>		
Wt. solids + moisture	W_0 <u>183.1</u>	<u>122.9</u> gms.
$W_0 \div 454$	W_0'	lbs.
Weight solids	W_s <u>132.6</u>	gms.
Wet density $W_0' \div V_0'$	<u>104.7</u>	<u>101.5</u> pcf
Dry density	<u>75.8</u>	<u>71.</u> pcf
<hr/>		
Net diameter	D_0 <u>2.02</u>	in.
Area $(0.785 D_0^2)$ (POST TEST CHECK)	A_0 <u>3.20</u>	<u>3.39</u> sq. in
Height	H_0 <u>2.03</u>	<u>2.03</u> in.
Volume $(A_0 H_0) \div 1728$	V_0'	cu. ft.
Volume $(A_0 H_0) \times 16.4$	V_0 <u>109.16</u>	cc
Specific gravity of solids	G_s <u>2.6</u>	
Volume of solids $W_s \div G_s$	V_s <u>51.00</u>	cc
$(V_0 - V_s) \div V_s$	e_i	
Initial burette reading		cc
Burette reading under pressure		cc
$(V_p - V_s) \div V_s$	e_p	
$1 - V_s/V_0$ Porosity	<u>= .533</u>	
$K = 7.99 \times 10^{-6}$ cm/sec		

PERMEABILITY TEST DATA

Owner EARTHFAK
 Job # 5461-022-8071
 Location _____
 Boring # DP-1
 Sample # _____
 Depth 265.0 - 265.55'
 Deflecting Speed 0 in/Hr
 Lateral Pressure 24624 PSF PSI
 Saturated ☒ Field Moisture ☐
 Sat-Up 5/21/87 Tested EEK (47 Office)
 Soil Type SILTSTONE

	Initial	Final
Weight soil & dish no. <u>434A</u>		<u>220.7</u>
Dry weight soil & dish		<u>163.9</u>
Net loss of moisture		
Weight of dish only		<u>17.0</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>36.8</u>	<u>38.7</u>

Wt. solids + moisture	W_0 <u>201.0</u>	<u>203.8</u> gms.
$W_0 + 454$	W_0'	lbs.
Weight solids	W_s <u>146.9</u>	gms.
Wet density $W_0' \div V_0'$	<u>112.8</u>	<u>116.5</u> pcf
Dry density	<u>82.5</u>	<u>83.9</u> pcf

Net diameter	D_0 <u>2.08</u>	in.
Area ($0.785 D_0^2$)	A_0 <u>3.39</u>	<u>3.33</u> sq. in.
Height	H_0 <u>2.00</u>	<u>2.00</u> in.
Volume ($A_0 H_0$) $\div 1728$	V_0'	cu. ft.
Volume ($A_0 H_0$) $\times 16.4$	V_0 <u>111.19</u>	cc
Specific gravity of solids	G_s <u>2.6</u>	
Volume of solids $W_s \div G_s$	V_s <u>56.50</u>	cc
$(V_0 - V_s) \div V_s$	e_i	
Initial burette reading		cc
Burette reading under pressure		cc
$(V_0 - V_s) \div V_s$	e_p	
$1 - V_s/V_0$ Porosity		<u>= .492</u>
$K = 1.49 \times 10^{-7}$ cm/sec		

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTHFA X
 Job # 5461-022-8071
 Location _____
 Boring # DP-2
 Sample # _____
 Depth 429'
 Deflecting Speed 0 in./Hr
 Lateral Pressure - 41760 - PSI
 Saturated ☒ Field Moisture ☐
 Set-Up _____ Tested _____ (Office)
 Soil Type F: SANDSTONE

	Initial	Final	
Weight soil & dish no. <u>466</u>	<u>173.3</u>	<u>255.0</u>	<u>43</u>
Dry weight soil & dish	<u>146.3</u>		
Net loss of moisture			
Weight of dish only	<u>16.5</u>	<u>8.39</u>	
Net weight of dry soil			
Moisture, % of dry weight	<u>20.8</u>	<u>19.9</u>	

Wt. solids + moisture	<u>W₀ 249.1</u>	<u>247.2</u>	gms.
$W_0 \div 454$	<u>W₀</u>		lbs.
Weight solids	<u>W_s 206.2</u>		gms.
Wet density $W_0 \div V_0$	<u>134.3</u>	<u>132.9</u>	pcf
Dry density	<u>111.2</u>	<u>110.8</u>	pcf

Net diameter	<u>D₀ 2.10</u>		in.
Area (0.785 D ₀ ²)	<u>A₀ 3.46</u>	<u>3.47</u>	sq. in.
Height	<u>H₀ 2.04</u>	<u>2.04</u>	in.
Volume (A ₀ H ₀) \div 1728	<u>V₀</u>		cu. ft.
Volume (A ₀ H ₀) \times 16.4	<u>V₀ 115.76</u>		cc
Specific gravity of solids	<u>G_s 2.6</u>		
Volume of solids $W_s \div G_s$	<u>V_s 79.31</u>		cc
$(V_0 - V_s) \div V_s$	<u>e_i</u>		
Initial burette reading			cc
Burette reading under pressure			cc
$(V_p - V_s) \div V_s$	<u>e_p</u>		
$1 - V_s/V_0$ Porosity		<u>= .315</u>	
$K = 2.13 \times 10^{-7}$			cm/sec

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTHFAK
 Job # 5461-022-8071
 Location _____
 Boring # DP-2
 Sample # _____
 Depth 278. - 278.4

Deflecting Speed 0 in/Hr
 Lateral Pressure 27792 PSD PSI
 Saturated ☒ Field Moisture ☐
 Set-Up 5/26/87 Tested EKC (47 Office)
 Soil Type SILTSTONE

	Initial	Final
Weight soil & dish no. <u>48</u>		<u>200.22</u>
Dry weight soil & dish		<u>149.80</u>
Net loss of moisture		
Weight of dish only		<u>2.25</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>36.9</u>	<u>36.0</u>

Wt. solids + moisture	<u>W₀ 194.1</u>	<u>192.8</u> gms.
W ₀ ÷ 454	<u>W₀</u>	lbs.
Weight solids	<u>W_s 141.8</u>	gms.
Wet density W ₀ ÷ V ₀	<u>110.5</u>	<u>106.3</u> pcf
Dry density	<u>80.7</u>	<u>78.2</u> pcf

Net diameter	<u>D₀ 2.09</u>	in.
Area (0.785 D ₀ ²)	<u>A₀ 3.429</u>	<u>3.54</u> sq. in.
Height	<u>H₀ 1.95</u>	<u>1.95</u> in.
Volume (A ₀ H ₀) ÷ 1728	<u>V₀</u>	cu. ft.
Volume (A ₀ H ₀) × 16.4	<u>V₀ 109.69</u>	cc
Specific gravity of solids	<u>G_s 2.6</u>	
Volume of solids W _s ÷ G _s	<u>V_s 54.54</u>	cc
(V ₀ - V _s) ÷ V _s	<u>e_i</u>	
Initial burette reading		cc
Burette reading under pressure		cc
(V _p - V _s) ÷ V _s	<u>e_p</u>	

$$1 - V_s / V_0 \text{ Porosity} = .503$$

$$K = 2.74 \times 10^{-7} \text{ cm/sec}$$

BACK - PRESSURE PERMEABILITY TEST DATA

Owner FALTA PAX
Job # 5461-022-8071
Location _____
Boring # DP-2
Sample # _____
Depth 129.2 - 129.8'

Deflecting Speed 0 in/Hr
Lateral Pressure 13000 PSF PSI
Saturated ☒ Field Moisture ☐
Set-Up 5/22/87 Tested 846 (97 Office)
Soil Type SILTSTONE CORE SAMPLED
SANDSTONE

	Initial	Final
Weight soil & dish no. 102		239.5
Dry weight soil & dish		182.6
Net loss of moisture		
Weight of dish only		13.2
Net weight of dry soil		
Moisture, % of dry weight	33.3	33.6

Wt. solids + moisture	W_0 224.9	225.4 gms.
$W_0 + 454$	W_0'	lbs.
Weight solids	W_s 168.7	gms.
Wet density $W_0' \div V_0'$	115.9	120.2 pcf
Dry density	86.9	89.9 pcf

Net diameter	D_0 2.17	in.
Area ($0.785 D_0^2$)	A_0 3.69	3.57 sq. in
Height	H_0 2.00	2.00 in.
Volume ($A_0 H_0$) $\div 1728$	V_0'	cu. ft.
Volume ($A_0 H_0$) $\times 16.4$	V_0 121.03	117.13 cc
Specific gravity of solids	G_s	
Volume of solids $W_s \div G_s$	V_s 64.88	64.88 cc
$(V_0 - V_s) \div V_s$	e_i	
Initial burette reading		cc
Burette reading under pressure		cc
$(V_p - V_s) \div V_s$	e_p	
$1 - V_s/V_0$ Porosity		.464 .466

$$K = 1.07 \times 10^{-6} \text{ cm/sec}$$

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTHRAK INC.
Job # 5461-022-8071
Location UT.
Boring # DP-4
Sample # _____
Depth 136.3'

Deflecting Speed 0 in/Hr
Lateral Pressure 13536 PSD PSI-94
Saturated ☒ Field Moisture ☐
Set-Up 6/1/87 Tested EEK (47 Office)
Soil Type M-C SANDSTONE

	Initial	Final
Weight soil & dish no. <u>A-9</u>		<u>264.7</u>
Dry weight soil & dish		<u>226.1</u>
Net loss of moisture		
Weight of dish only		<u>7.6</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>29.7</u>	<u>29.5</u>

Wt. solids + moisture	<u>W₀ 260.2</u>	<u>259.7</u>	gms.
<u>W₀ ÷ 454</u>	<u>W₀</u>		lbs.
Weight solids	<u>W_s 200.5</u>		gms.
Wet density <u>W₀ ÷ V₀</u>	<u>119.7</u>	<u>119.3</u>	pct
Dry density	<u>92.</u>	<u>92.</u>	pct

Net diameter	<u>D₀</u>		in.
Area (<u>0.785 D₀²</u>)	<u>A₀ 3.49</u>		sq. in
Height <u>2.3 - 2.45 - 2.35</u>	<u>H₀ 2.37</u>		in.
Volume (<u>A₀H₀</u>) ÷ 1728	<u>V₀</u>		cu. ft.
Volume (<u>A₀H₀</u>) x 16.4	<u>V₀ 135.8</u>		cc
Specific gravity of solids	<u>G_s 2.6</u>		
Volume of solids <u>W_s ÷ G_s</u>	<u>V_s 77.11</u>		cc
<u>(V₀ - V_s) ÷ V_s</u>	<u>e_i</u>		
Initial burette reading			cc
Burette reading under pressure			cc
<u>(V_p - V_s) ÷ V_s</u>	<u>e_p</u>		

$$(1 - (V_s / V_0)) \text{ Porosity} = .432$$

$$K = 8.72 \times 10^{-5} \text{ cm/sec}$$

BACK - PRESSURE PERMEABILITY TEST DATA

Owner EARTH FAX ENR.
 Job # 5461-022-8071
 Location UT.
 Boring # DP-4
 Sample # _____
 Depth 234-234.5

Deflecting Speed 0 in/Hr
 Lateral Pressure 160 Min
 Saturated ☒ Field Moisture ☐ PSF - 23.040
 PSI
 Set-Up 6/2/87 Tested EH (87 Office)
 Soil Type SILT/CLAYSTONE

	Initial	Final
Weight soil & dish no. <u>89</u>		<u>226.2</u>
Dry weight soil & dish		<u>159.0</u>
Net loss of moisture		
Weight of dish only		<u>16.6</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>47.4</u>	<u>47.2</u>

Wt. solids + moisture	W_0 <u>210.1</u>	<u>209.7</u> gms.
$W_0 \div 454$	W_0'	lbs.
Weight solids	W_s <u>142.5</u>	gms.
Wet density $W_0' \div V_0'$	<u>115.1</u>	<u>112.9</u> pcf
Dry density	<u>78.1</u>	<u>76.7</u> pcf

Net diameter	D_0 <u>2.11</u>	in.
Area ($0.785 D_0^2$)	A_0 <u>3.49</u>	<u>3.55</u> sq. in.
Height	H_0 <u>1.99</u>	in.
Volume ($A_0 H_0$) $\div 1728$	V_0'	cu. ft.
Volume ($A_0 H_0$) $\times 16.4$	V_0 <u>113.89</u>	cc.
Specific gravity of solids	G_s <u>2.6</u>	
Volume of solids $W_s \div G_s$	V_s <u>54.81</u>	cc.
$(V_0 - V_s) \div V_s$	e_i	
Initial burette reading		cc.
Burette reading under pressure		cc.
$(V_p - V_s) \div V_s$	e_p	

$$(1 - (V_s / V_0)) \text{ Porosity} = .519$$

$$K = 4.47 \times 10^{-8} \text{ cm/sec}$$

**BACK - PRESSURE
PERMEABILITY TEST DATA**

Owner EARTH FAX ENGR.
 Job # 5461-022-8071
 Location VT.
 Boring # DP-4
 Sample # _____
 Depth 435.5 - 436.0'
 Deflecting Speed 0 in/Hr
 Lateral Pressure 37584 ~~PSF~~ ^{PSI}
 Saturated ☒ Field Moisture ☐
 Set-Up 6/2/87 Tested EEK (47 Office)
 Soil Type SILT/CLAY STONE - CORE -

	Initial	Final
Weight soil & dish no. 151		289.3
Dry weight soil & dish		199.2
Net loss of moisture		
Weight of dish only 75		15.2
Net weight of dry soil		
Moisture, % of dry weight	48.8	48.9
<hr/>		
Wt. solids + moisture	W ₀ 274.2	274.4 gms.
W ₀ ÷ 454	W ₀	lbs.
Weight solids	W _s 184.3	gms.
Wet density W ₀ ÷ V ₀	106.6	105.2 pcf
Dry density	72.	71. pcf
<hr/>		
Net diameter	D ₀ 2.13	in.
Area (0.785 D ₀ ²)	A ₀ 3.56	3.61 sq. in
Height	H ₀ 2.75	2.75 in.
Volume (A ₀ H ₀) ÷ 1728	V ₀	cu. ft.
Volume (A ₀ H ₀) x 16.4	V ₀ 160.56	cc
Specific gravity of solids	G _s 2.6	
Volume of solids W _s ÷ G _s	V _s 70.88	cc
(V ₀ - V _s) ÷ V _s	e _i	
Initial burette reading		cc
Burette reading under pressure		cc
(V _p - V _s) ÷ V _s	e _p	

$$1 - (V_s/V_0) \text{ Porosity} = .559$$

$$K = 1.23 \times 10^{-8} \text{ cm/sec}$$

BACK - PRESSURE PERMEABILITY TEST DATA



(NOTE VERTICAL FRACTURE)

$$\begin{aligned} \bar{\sigma}_3 &= 104 \text{ psi} \\ B_{p1} &= 49 \\ B_{p2} &= 47 \end{aligned} \left. \vphantom{\begin{aligned} \bar{\sigma}_3 &= 104 \text{ psi} \\ B_{p1} &= 49 \\ B_{p2} &= 47 \end{aligned}} \right\} \Delta p = 2 \text{ psi}$$

$$11 = 4.98 \times 10^{-6} \text{ cm/sec}$$

$$\text{Porosity } n = \frac{V_v}{V} ; = .52$$

$$s.d.f. = 80.8 \text{ pcf}$$

Owner EARTHMAX
Job # 5071
Location _____
Boring # DP-5
Sample # _____
Depth 150.9 - 151.3

Deflecting Speed 0 in/Hr
Lateral Pressure 14976 PSF
Saturated ☒ Field Moisture ☐
Set-Up 3/1/88 Tested EEC (47 Office)
Soil Type SILTSTONE
NOTE VERTICAL FRACTURE

	Initial	Final
Weight soil & dish no. 31		303.0
Dry weight soil & dish		254.9
Net loss of moisture		
Weight of dish only		110.6
Net weight of dry soil		
Moisture, % of dry weight	42.9	43.3
<hr/>		
Wt. solids + moisture	W ₀ 373.1	374.1 gms.
W ₀ ÷ 454	W ₀ '	lbs.
Weight solids	W _s 261.0	gms.
Wet density W ₀ ' ÷ V ₀	113.8	115.8 pcf
Dry density	79.6	80.8 pcf
<hr/>		
Net diameter	D ₀ 2.11	in.
Area (0.785 D ₀ ²)	A ₀ 3.195	3.439 sq. in.
Height	H ₀ 3.57	3.575 in.
Volume (A ₀ H ₀) ÷ 1728	V ₀ '	cu. ft.
Volume (A ₀ H ₀) × 16.4	V ₀ 204.63	201.63 cc
Specific gravity of solids	G _s 2.65	
Volume of solids W _s ÷ G _s	V _s 98.49	cc
(V ₀ - V _s) ÷ V _s	e _i 1.077	1.0477
Initial burette reading		cc
Burette reading under pressure		cc
(V _p - V _s) ÷ V _s	e _p	

SATURATION DATA

NO.: 8071

LOCATION: SLC

Sample:

Depth: 150.9-151 (ft./m.)

Set up:

Type of Test:

Call No.:

Dial No.:

[illegible]

PROJECT: _____ No.: _____ LOCATION: _____
 Spring No.: DP-5 Sample: _____ Depth: 150.9 (ft./m.)

DATE	TIME	ELAPSED TIME (MIN)	CHAMBER PRESSURE (PSI)	BACK PRESS 1 (PSI)	BACK PRESS 2 (PSI)	EXTERNAL BURETTE OR DIAL RDG. (CC)/(IN.)	INTERNAL BURETTE (CC)	PORE PRESSURE (PSI)
3/2/88	1112	0	153	49	46	410	22.4	
	1113			49	47		22.0	
	1114	0	153	"	"	410	22.1	
	1131					410	18.2	22.9
	1145						15.8	12
	1146	0	153	49	47	410	23.2	
	1206						19.6	12
	1229						16.2	16.2
	1255						12.4	14
	1256	0	153	49	47	410	23.5	
	1335						17.9	14
	1431						11.0	12
	1506						7.4	10 ✓
	1507	0	153	49	47	410	22.7	
	1527						20.5	10 ✓
	1547						18.3	10 ✓

$$\underline{P_{bp}} \quad \bar{\sigma}_3 = 104 \text{ psi}$$

$$K_{20-C} = \frac{QL}{t h A} \times \frac{U_T}{U_{20-C}}$$

$$1 \text{ psi} = 70.1 \text{ mm}$$

$$Q = 22.7 - 20.5 = 2.2 \text{ cc}$$

$$h = 2 (70.1) = 140.2 \text{ mm}$$

$$L = 9.08 \text{ mm}$$

$$U_T = .931 (23^\circ \text{C})$$

$$t = 20 (60) = 1200 \text{ sec}$$

$$A = 22.21 \text{ cm}^2$$

$$K_{20-C} = \frac{2.2(9.08)}{1200(140.2)(22.21)} \times .931 = 4.98 \times 10^{-6} \text{ cm/sec}$$

NOTE:

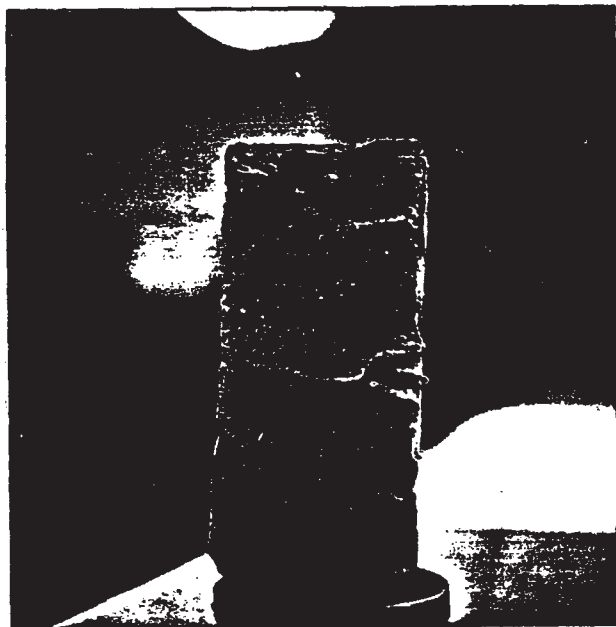
ALL VALUES (CONSTANTS) TAKEN FROM
 T_u/m/10 AFTER SATURATION & CONSOLIDATION
 SEE DATA SHEET.

BY _____ DATE _____
 CHECKED BY _____

PERMEABILITY TEST DATA

Owner EARTH FAX
 Job # 8071
 Location _____
 Boring # DP-6
 Sample # _____
 Depth 338 - 339.5'

Deflecting Speed 0 in/Hr
 Lateral Pressure 25920 ~~BSP~~ PSI-180
 Saturated ☒ Field Moisture ☐
 Set-Up 3/1/88 Tested EPK (47 Office)
 Soil Type SANDSTONE



	Initial	Final
Weight soil & dish no. 61		<u>410.5</u>
Dry weight soil & dish		<u>353.6</u>
Net loss of moisture		
Weight of dish only		<u>105.2</u>
Net weight of dry soil		
Moisture, % of dry weight	<u>22.5</u>	<u>22.9</u>

Wt. solids + moisture	<u>W₀ 514.3</u>	<u>516.1</u>	gms.
W ₀ ÷ 454	<u>W₀</u>		lbs.
Weight solids	<u>W_s 419.9</u>		gms.
Wet density W ₀ ÷ V ₀	<u>125.7</u>	<u>124.6</u>	pcf
Dry density	<u>102.6</u>	<u>101.4</u>	pcf

Net diameter	<u>D₀ 2.10</u>		in.
Area (0.785 D ₀ ²)	<u>A₀ 3.462</u>	<u>3.51</u>	sq. in.
Height	<u>H₀ 4.50</u>	<u>4.49</u>	in.
Volume (A ₀ H ₀) ÷ 1728	<u>V₀</u>		cu. ft.
Volume (A ₀ H ₀) × 16.4	<u>V₀ 255.49</u>	<u>258.49</u>	cc
Specific gravity of solids	<u>G_s 2.65</u>		
Volume of solids W _s ÷ G _s	<u>V_s 158.45</u>		cc
(V ₀ - V _s) ÷ V _s	<u>e_i .612</u>	<u>.631</u>	
Initial burette reading			cc
Burette reading under pressure			cc
(V _p - V _s) ÷ V _s	<u>e_p</u>		

$$\bar{\sigma}_3 = 180 \text{ psi} (25920)$$

$$\left. \begin{array}{l} Bp_1 = 39 \\ Bp_2 = 36 \end{array} \right\} \Delta p = 3 \text{ psi}$$

$$K = 1.44 \times 10^{-7} \text{ cm/sec}$$

$$\text{Porosity} = n = \frac{V_v}{V} = .38$$

$$\gamma_{df} = 101.4 \text{ pcf}$$

SATURATION DATA

NO.: 8071

LOCATION: SLC

Sample:

Depth: 339' (ft./m.)

Set up: ESL 3 / 1 / SL

$$\sigma_3 = \underline{180} \text{ psi} = \underline{\hspace{2cm}} \text{ psf}$$

Type of Test: PBP

Cell No.: 24

Dial No.:

Page _____ of _____

PROJECT: _____ NO.: _____ LOCATION: _____
 boring No.: DP-6 Sample: _____ Depth: 338 (ft./m.) _____

DATE	TIME	ELAPSED TIME (MIN)	CHAMBER PRESSURE (PSI)	BACK PRESS 1 (PSI)	BACK PRESS 2 (PSI)	EXTERNAL BURETTE OR DIAL ROD. (CC)/(IN.)	INTERNAL BURETTE (CC)	PORE PRESSURE (PSI)
3/2/88	1111	0	219	39	36	538	20.1	
	1144					537	19.9	
	1205						19.8	
	1225						19.7	
	1245						19.6	
	1310						19.5	
	1340						19.4	
	1430						19.2	
	1520					537	19.0	

$$\underline{P_{bp}} \quad \bar{\sigma}_3 = 18.0 \text{ psi}$$

$$K_{20-C} = \frac{QL}{\epsilon h A} \times \frac{U_T}{U_{20-C}}$$

$$1 \text{ psi} = 70.1 \text{ cm}$$

$$Q = 19.6 - 19.0 = 0.6 \text{ cc}$$

$$h = 3 (70.1) = 210.3 \text{ cm}$$

$$L = 11.40 \text{ cm}$$

$$U_T = .931 (23^\circ \text{C})$$

$$\epsilon = 155 (60) = 9300 \text{ sec}$$

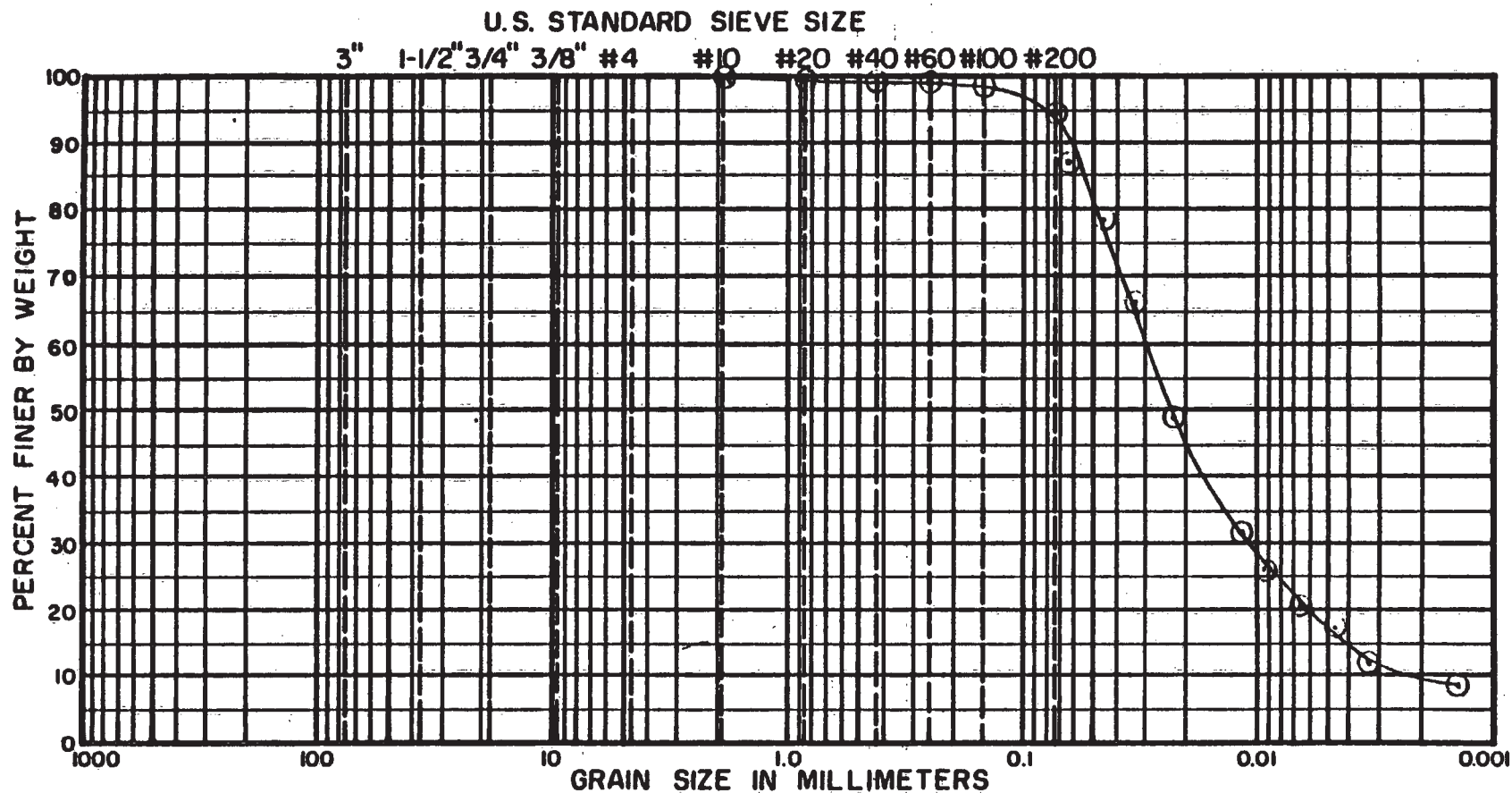
$$A = 22.67 \text{ cm}^2$$

$$K_{20-C} = \frac{0.6 (11.40)}{9300 (210.3) (22.67)} \times .931 = 1.44 \times 10^{-7} \text{ cm/sec}$$

NOTE:

ALL VALUES (CONSTANTS) TAKEN FROM
 T₀/m/OP AFTER SATURATION & CONSOLIDATION
 SEE DATA SHEET.

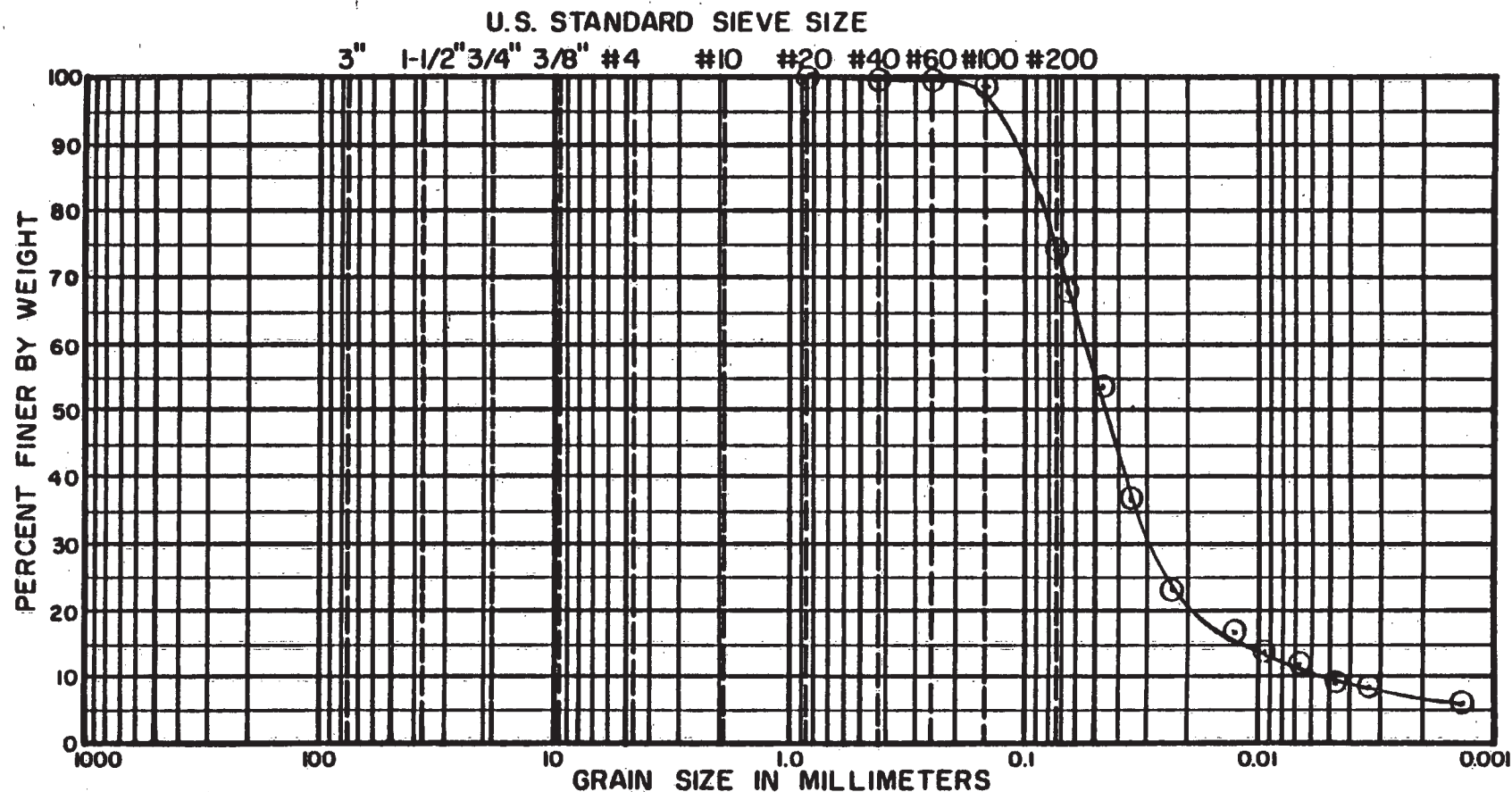
DATE _____
 CHECKED BY _____



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
LOCATION	DEPTH		CLASSIFICATION				
OW-1	21.1-21.5'		ML (NP)				

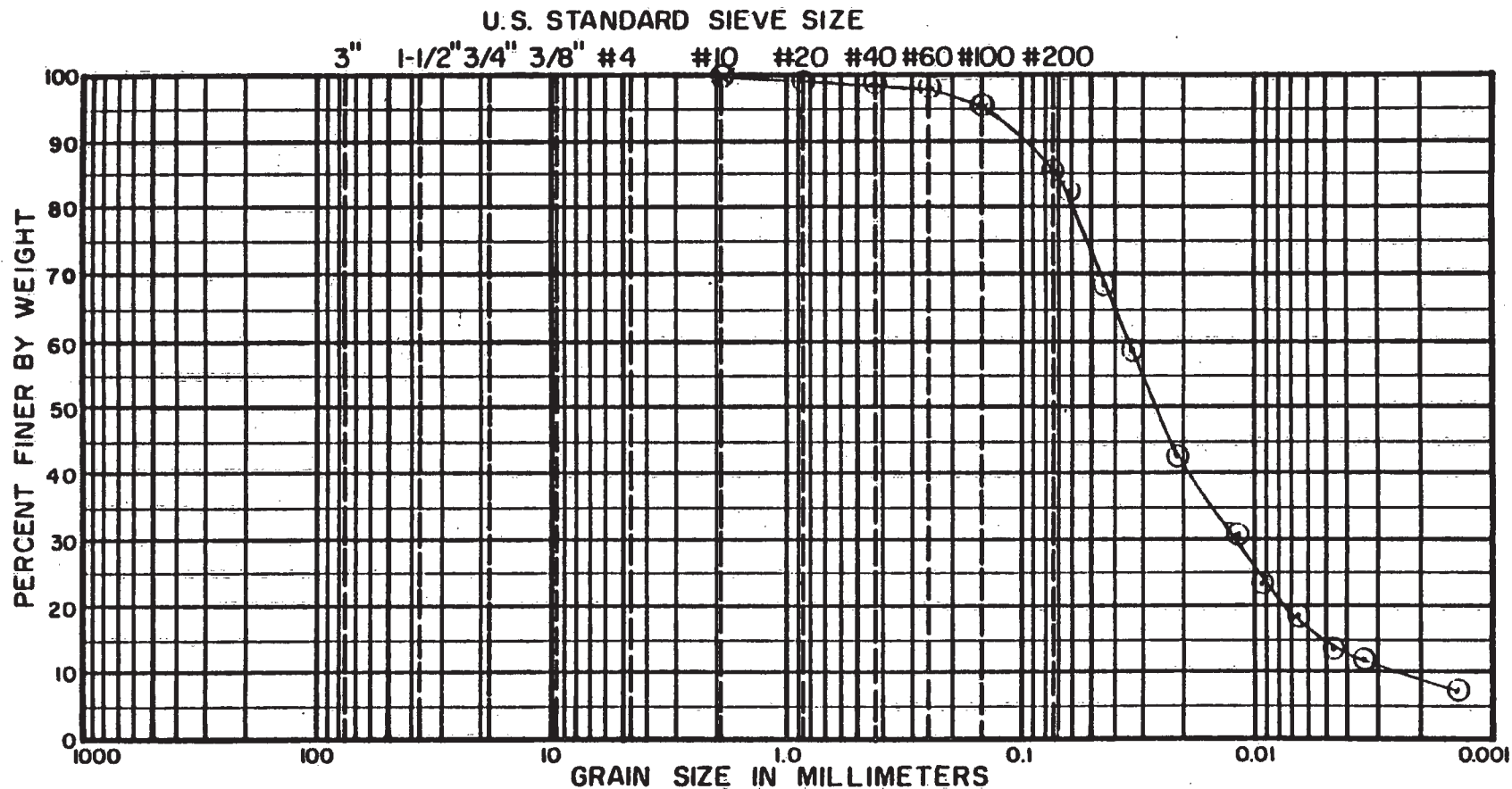
Liquid Limit = -
 Plastic Limit = NP
 Porosity = .465
 Moisture = 35.4%

Density = 86.8 pcf



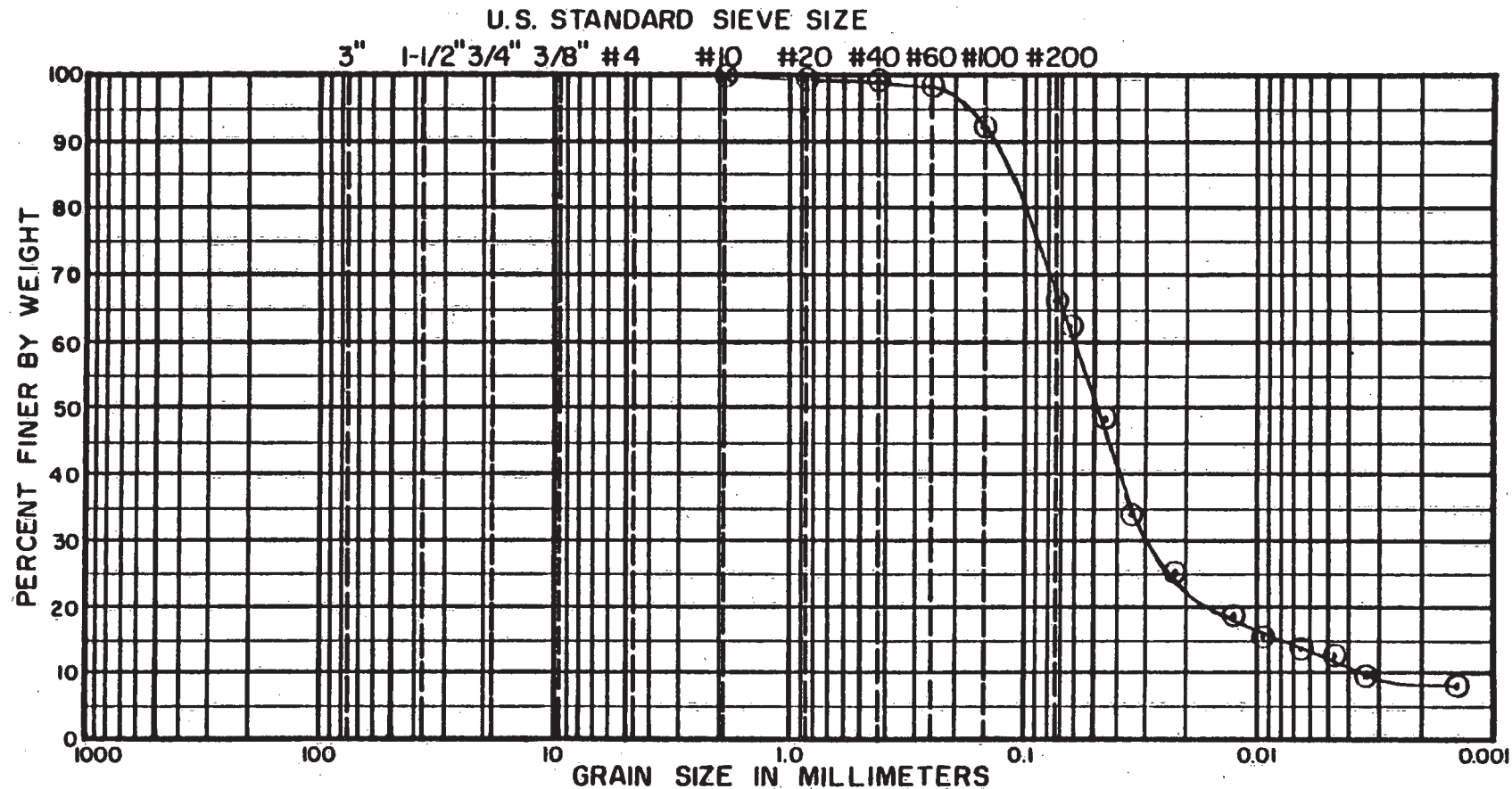
COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
LOCATION	DEPTH		CLASSIFICATION				
OW - 1	30.1 - 30.5		ML (NP)				

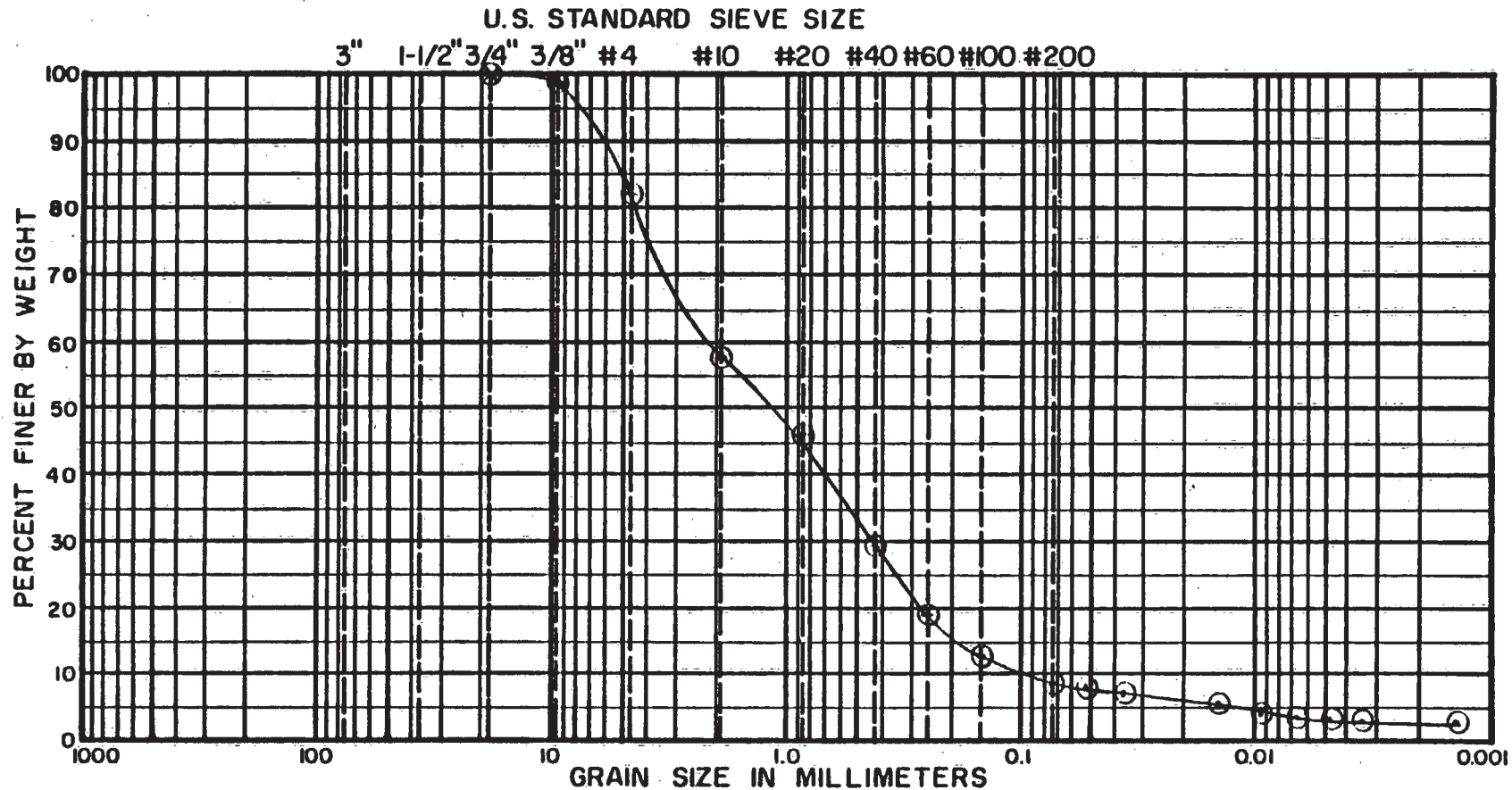
LIQUID LIMIT = -
 PLASTIC LIMIT = NP
 POROSITY = .503
 MOISTURE = 25.2%
 DENSITY = 80.6 pcf



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
LOCATION	DEPTH		CLASSIFICATION				
OW - 1	40.0 - 40.5'		ML (NP)				

LIQUID LIMIT = —
 PLASTIC LIMIT = NP
 POROSITY = .488
 MOISTURE = 33.1%
 DENSITY = 83.0 pcf

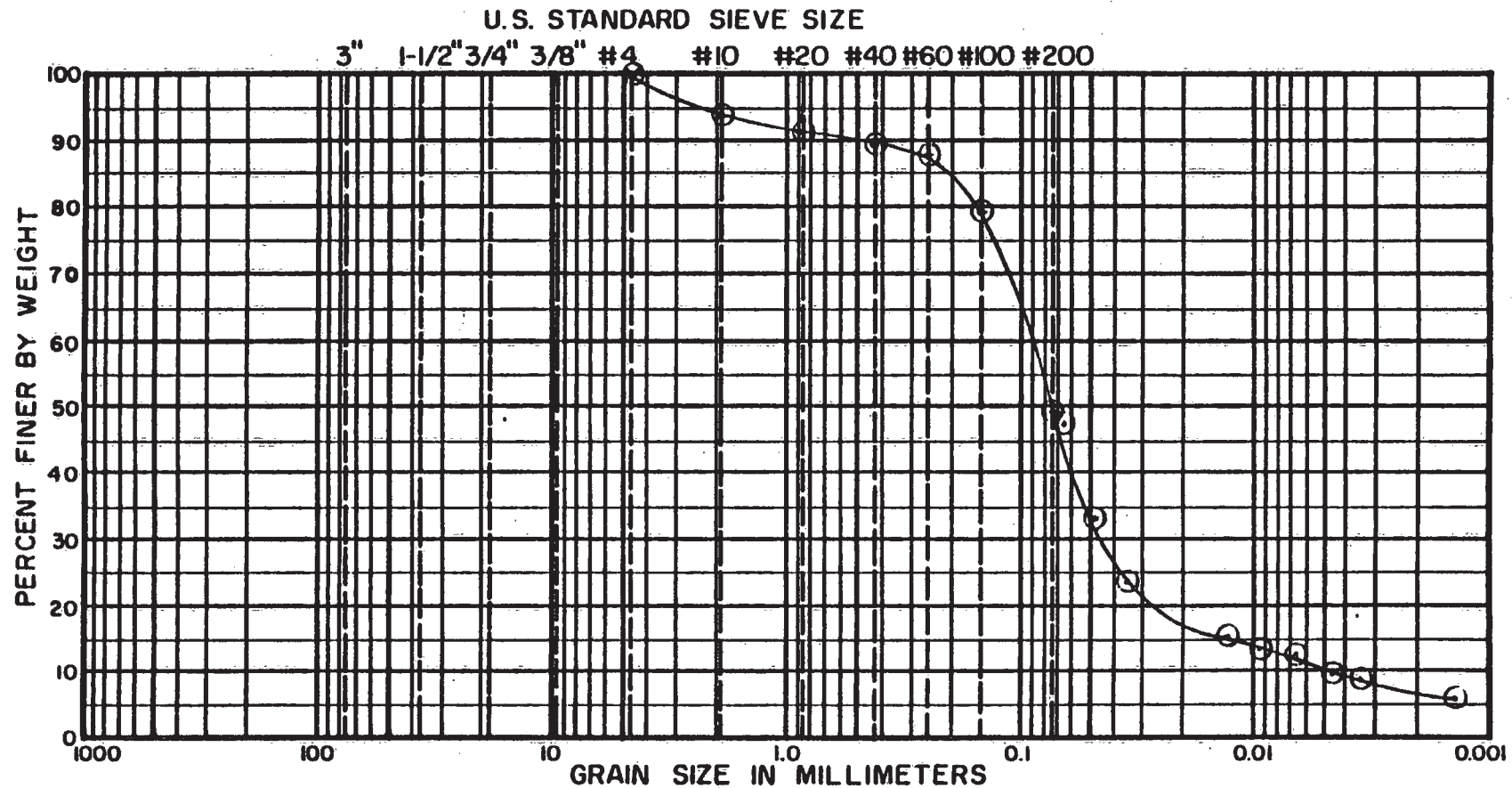




COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

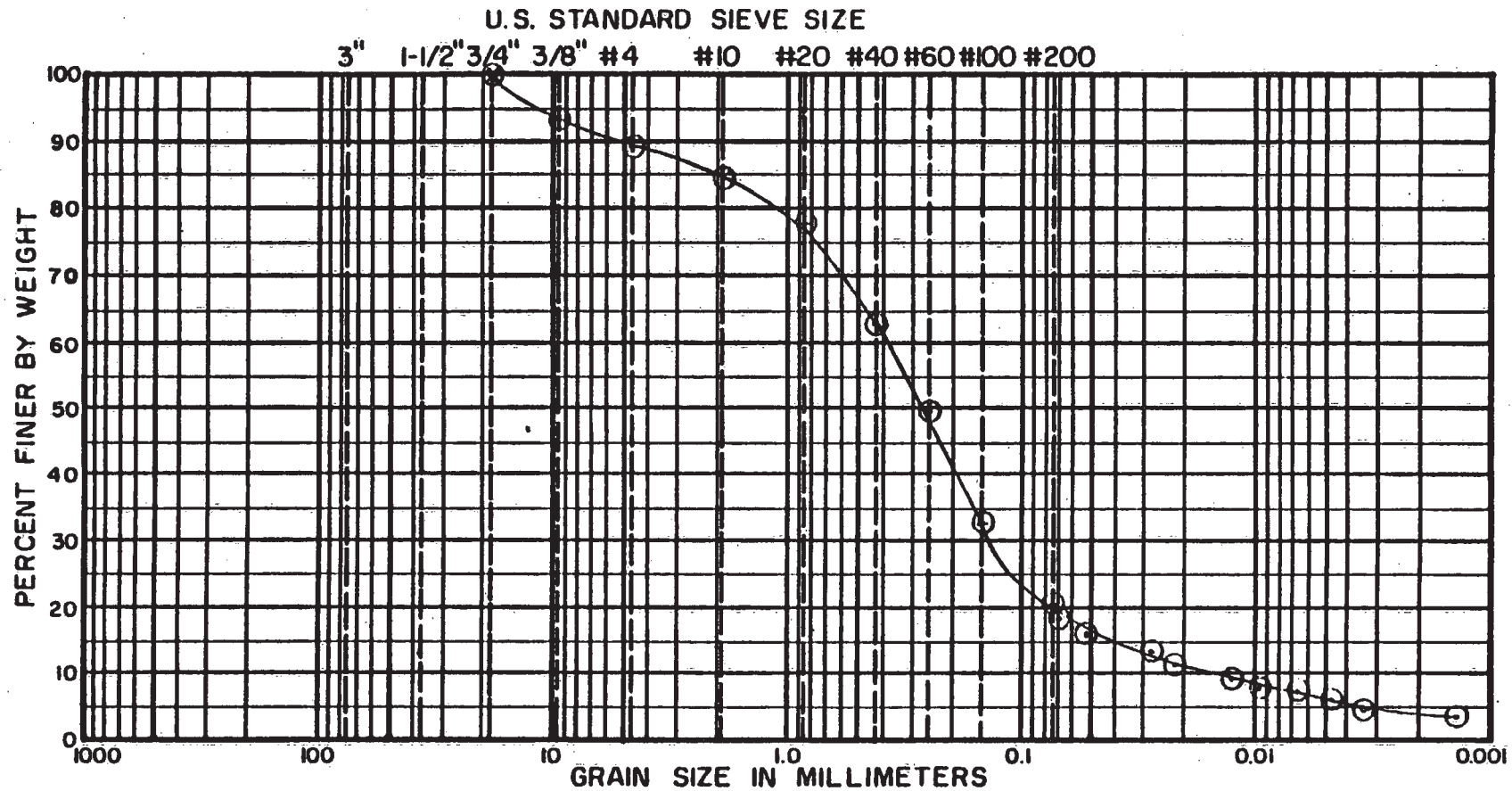
LOCATION	DEPTH	CLASSIFICATION
OW-1	60.0 - 60.5'	SP-SM

LIQUID LIMIT = —
 PLASTIC LIMIT = NP
 POROSITY = SAMPLE NOT APPROPRIATE (ALL FRACTURED)
 MOISTURE = 11.1 %
 DENSITY = SAMPLE NOT APPROPRIATE "



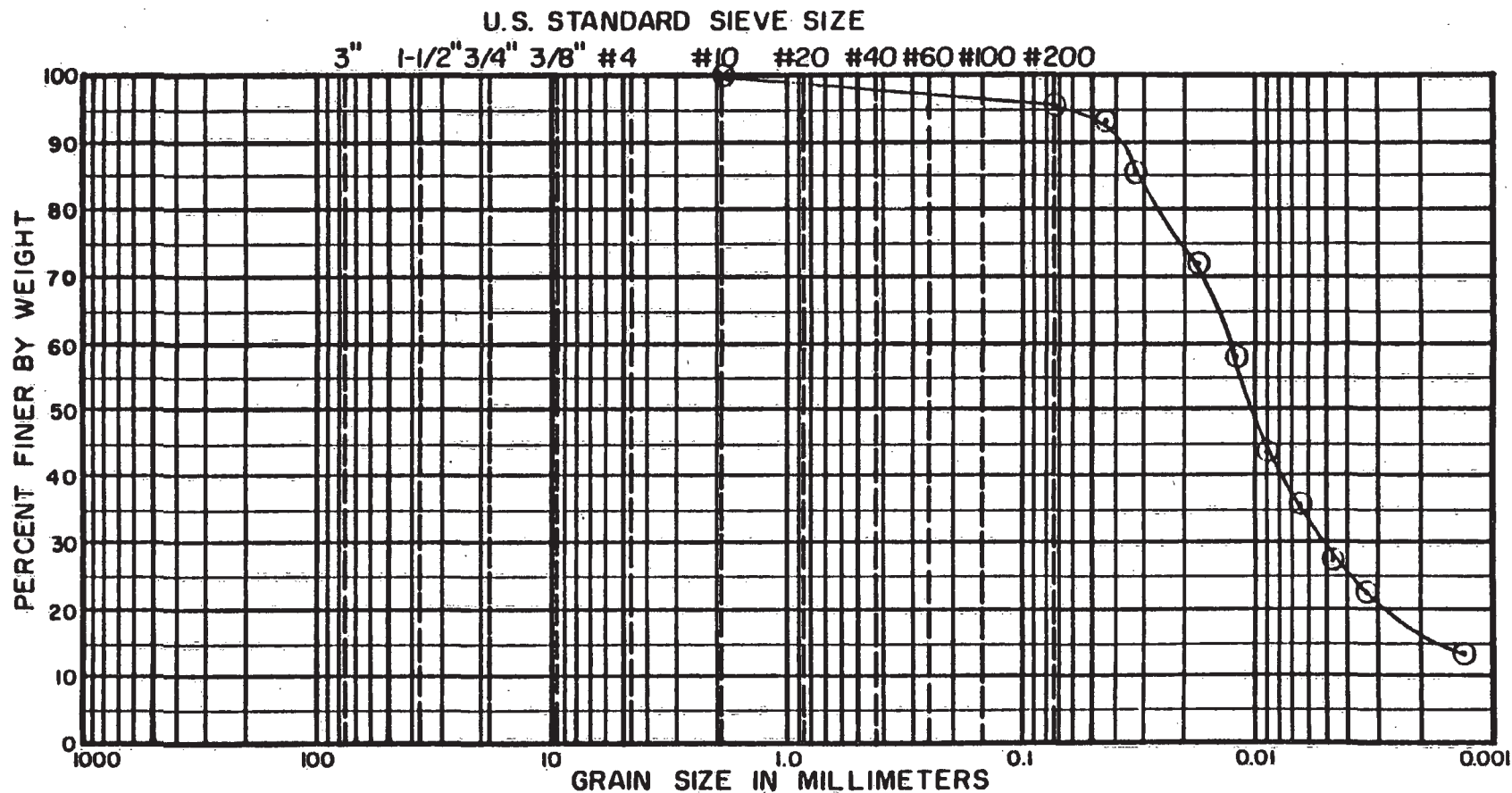
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
LOCATION	DEPTH		CLASSIFICATION			
OW-2	20.7-21.0'		SM			

Liquid Limit = -
 Plastic Limit = NP
 Porosity = .451
 Moisture = 20.2%
 Density = 89.0 pcf



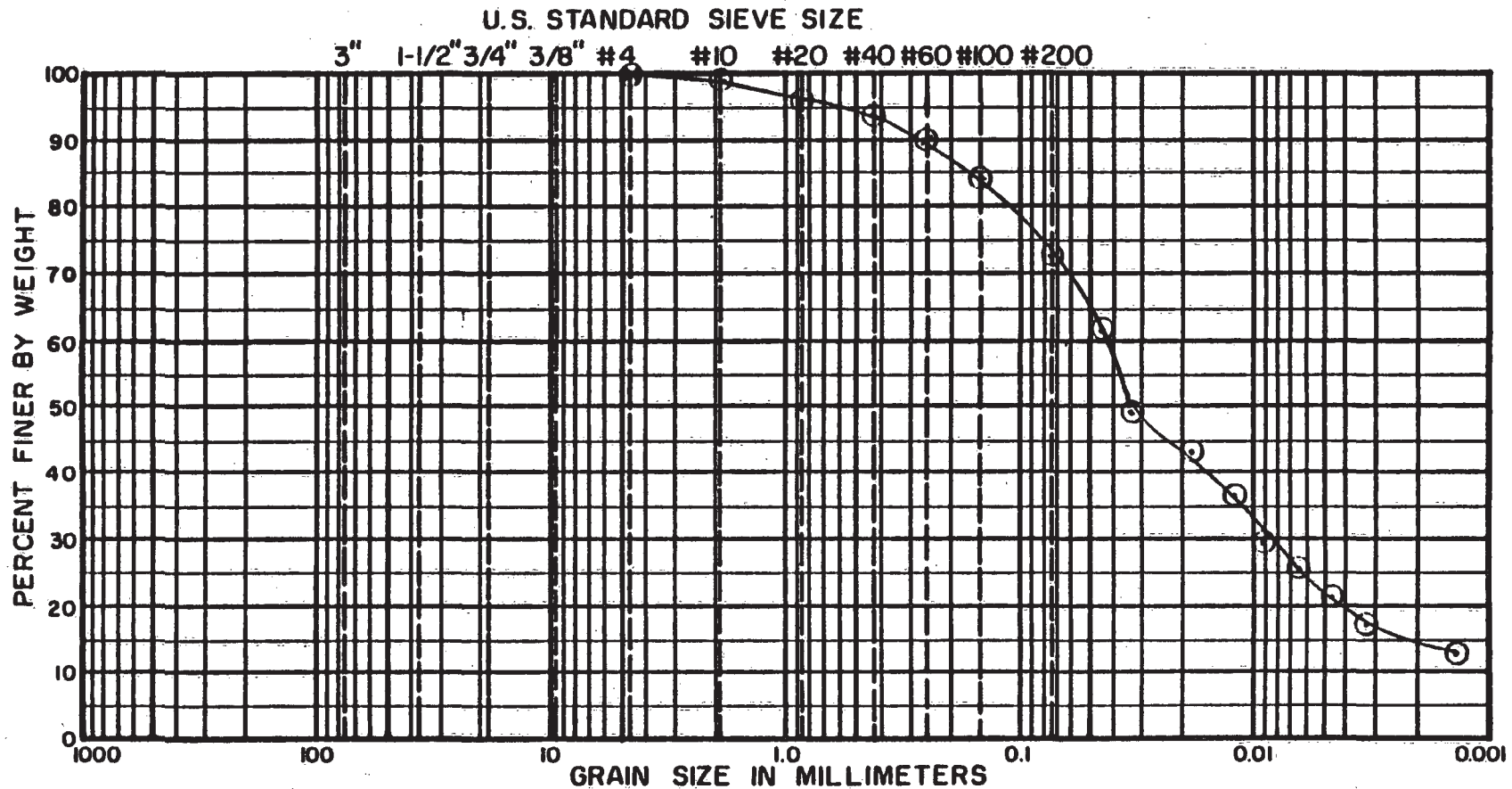
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
LOCATION	DEPTH		CLASSIFICATION			
OW-2	26.5'		SM			

LIQUID LIMIT = -
 PLASTIC LIMIT = NP
 POROSITY = SAMPLE NOT APPROPRIATE (COMPLETELY FRACTURED)
 DENSITY = " " " " "
 MOISTURE = 12.1%



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE		
LOCATION	DEPTH		CLASSIFICATION				
OW-3	15.5-16.0'		ML				

LIQUID LIMIT = 38
 PLASTIC LIMIT = 31
 POROSITY = .549
 MOISTURE = 46.2%
 DENSITY = 73.3 pcf



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION
OW-3	25.2 - 25.5	CL

LIQUID LIMIT = 37
 PLASTIC LIMIT = 23
 POROSITY = .479
 MOISTURE = 35.2%
 DENSITY = 84.4 pcf

REPORT

ORDER NO. SLC-6695

DATE June 3, 1986

Lab No.: 86-00274

Earth Fax Engineering
6542 South 670 West
Murray, Utah 84107

Subject: Gradation (ASTM C-136/C-117) of soil samples submitted 5/21/86

Results:

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-1 (30-35')</u>	<u>GW-2 (65-70')</u>	<u>GW-3 (115-120')</u>	<u>GW-4 (60-65')</u>
1/2"				100
3/8"	100	100	100	94
#4	96	99	98	79
#10	67	93	92	61
#20	50	84	74	47
#40	41	80	62	40
#60	36	77	51	34
#140	24	60	40	23
#200	21	55	38	21

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-5 (35-40')</u>	<u>GW-6 (65-70')</u>	<u>GW-7 (75-80')</u>	<u>GW-8 (115-120')</u>
1/2"			100	
3/8"	100	100	97	100
#4	100	89	81	100
#10	99	69	62	100
#20	98	56	48	99
#40	97	49	41	98
#60	97	43	35	96
#140	88	29	23	81
#200	84	25	21	74

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-9 (60-65')</u>	<u>GW-10 (100-105')</u>	<u>GW-11 (70-75')</u>	<u>GW-12 (34-40')</u>
1/2"	100			
3/8"	99	100	100	100
#4	85	100	98	94
#10	66	98	94	77
#20	51	90	88	66
#40	43	85	83	61
#60	38	81	80	56
#140	26	61	62	39
#200	23	57	57	35

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-13 (85-90')</u>	<u>GW-14 (30-35')</u>	<u>GW-15 (85-90')</u>	<u>GW-16 (85-90')</u>
1/2"			100	
3/8"	100	100	99	100
#4	100	100	86	97
#10	99	98	70	87
#20	96	96	57	64
#40	93	93	49	51
#60	91	89	43	43
#140	51	74	30	28
#200	48	71	28	26

U. S. Stand. Sieve Size.	-----Percent Passing, by Weight-----			
	<u>GW-17 (110-115')</u>	<u>GW-18 (75-80')</u>	<u>GW-19(A)(75-80')</u>	<u>GW-20 (25-30')</u>
1/2"		100	100	
3/8"	100	97	99	100
#4	96	90	93	100
#10	91	73	78	96
#20	83	63	64	85
#40	75	55	55	75
#60	69	49	49	65
#140	47	32	33	44
#200	45	30	32	40

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-21 (25-30')</u>	<u>GW-22 (35-40')</u>	<u>GW-23 (80-85')</u>	<u>GW-24 (95-100')</u>
1/2"				100
3/8"	100	100	100	97
#4	100	99	97	93
#10	97	93	80	86
#20	81	82	65	81
#40	72	72	57	77
#60	64	61	51	72
#140	52	33	36	54
#200	40	30	34	51

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-25 (110-115')</u>	<u>GW-26 (110-115')</u>	<u>GW-27 (85-90')</u>	<u>GW-28 (105-110')</u>
1/2"		100		
3/8"	100	98	100	100
#4	99	94	100	99
#10	92	84	99	97
#20	82	74	96	93
#40	72	67	90	90
#60	61	61	82	85
#140	37	41	53	54
#200	33	37	49	59 49

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-29 (95-100')</u>	<u>GW-30 (200-205')</u>	<u>GW-31 (200-205')</u>	<u>GW-32 (150-155')</u>
1/2"			100	
3/8"	100	100	94	100
#4	99	94	70	88
#10	98	71	48	70
#20	96	55	38	66
#40	94	49	33	60
#60	89	45	30	54
#140	46	36	23	40
#200	42	34	21	32

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-33 (170-175')</u>	<u>GW-34 (175-180')</u>	<u>GW-35 (165-170')</u>	<u>GW-36 (170-175')</u>
1/2"	100		100	100
3/8"	97	100	89	92
#4	82	94	73	76
#10	57	81	57	64
#20	43	71	47	48
#40	38	64	41	42
#60	35	58	37	38
#140	27	40	26	30
#200	25	27	24	28

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----			
	<u>GW-37 (40-45')</u>	<u>GW-38 (35-45')</u>	<u>GW-39 (45-50')</u>	<u>GW-40 (35-40')</u>
1/2"				100
3/8"	100	100	100	99
#4	100	98	99	90
#10	93	69	96	77
#20	91	55	88	65
#40	88	49	84	58
#60	85	46	80	53
#140	64	33	60	40
#200	57	30	55	37

U. S. Stand. Sieve Size	-----Percent Passing, by Weight-----	
	<u>GW-41 (55-60')</u>	<u>GW-42 (35-40')</u>
1/2"		
3/8"	100	100
#4	99	89
#10	94	69
#20	85	57
#40	77	52
#60	70	47
#140	51	32
#200	47	29

Respectfully submitted,

PTL-INSPECTORATE INC.

Robert C. Mathews
Robert C. Mathews, Manager



PTL-SALT LAKE CITY

 2955 S. W. TEMPLE STREET
 SALT LAKE CITY, UTAH 84115
 801/484-8827

REPORT

ORDER NO. SLC-6695

DATE May 20, 1986

Lab No.: 86-00263

Earth Fax Engineering
 6542 South 670 West
 Murray, Utah 84107

Subject: Liquid Limits, Plastic Limit, and Plasticity Index of soil
 samples submitted 5/16/86

Results:

Sample No. (PTL)	Sample Designation	Liquid Limit	Plastic Limit	Plastic Index
1	GW-13 (85-90') 10/17/85	NP	NP	NP
2	GW-12 (35-40') 9/24/85	NP	NP	NP
3	GW-20 (25-30')	NP	NP	NP
4	GW-14 (30-35') 9/24/85	29	24	5
5	GW-11 (70-75') 10/8/85	NP	NP	NP
6	GW-10 (100-105') 9/24/85	41	34	7
7	GW-9 (60-65') 9/18/85	NP	NP	NP
8	GW-8 (115-120') 9/24/85	NP	NP	NP
9	GW-18 (75-80') 10/2/85	22	19	3
10	GW-16 (85-90') 9/29/85	NP	NP	NP
11	GW-19 (A) (75-80') 10/24/85	NP	NP	NP
12	GW-17 (110-115') 10/13/85	31	24	7
13	GW-7 (75-80') 9/20/85	NP	NP	NP
14	GW-6 (65-70')	NP	NP	NP
15	GW-3 (115-120') 9/19/85	64	44	20
16	GW-15 (85-90') 9/27/85	NP	NP	NP
17	GW-24 (95-100') 10/8/85	26	21	5
18	GW-23 (80-85') 10/17/85	NP	NP	NP
19	GW-22 (35-40') 10/7/85	33	30	3
20	GW-21 (25-30') 10/7/85	34	27	7
21	GW-30 (200-205')	17	15	2
22	GW-29 (95-100') 10/7/85	NP	NP	NP
23	GW-28 (105-110') 10/18/85	NP	NP	NP

Sample No. (PTL)	Sample Designation	Liquid Limit	Plastic Limit	Plastic Index
24	GW-27 (85-90') 10/13/85	NP	NP	NP
25	GW-35 (165-170')	17	16	1
26	GW-37 (40-45')	NP	NP	NP
27	GW-36 (170-175') 10/ /85	18	16	2
28	GW-34 (175-180') 10/13/85	NP	NP	NP
29	GW-33 (170-175') 10/28/86	19	17	2
30	GW-39 (45-50')	NP	NP	NP
31	GW-42 (35-40')	22	19	3
32	GW-41 (55-60') 11/6/85	NP	NP	NP
33	GW-40 (35-40')	23	19	4
34	GW-31 (200-205')	18	17	1
35	GW-38 (35-40') 11/2/85	NP	NP	NP
36	GW-26 (110-115') 10/13/85	NP	NP	NP
37	GW-32 (150-155')	NP	NP	NP
38	GW-2 (65-70')	NP	NP	NP
39	GW-4 (60-61')	18	17	1
40	GW-5 (35')	NP	NP	NP
41	GW-1 (30'-35')	NP	NP	NP
42	GW-25 (115'-120')	50	27	3

Respectfully submitted,

PTL-INSPECTORATE INC.

Robert C. Mathews
Robert C. Mathews, Manager
Salt Lake City District

er

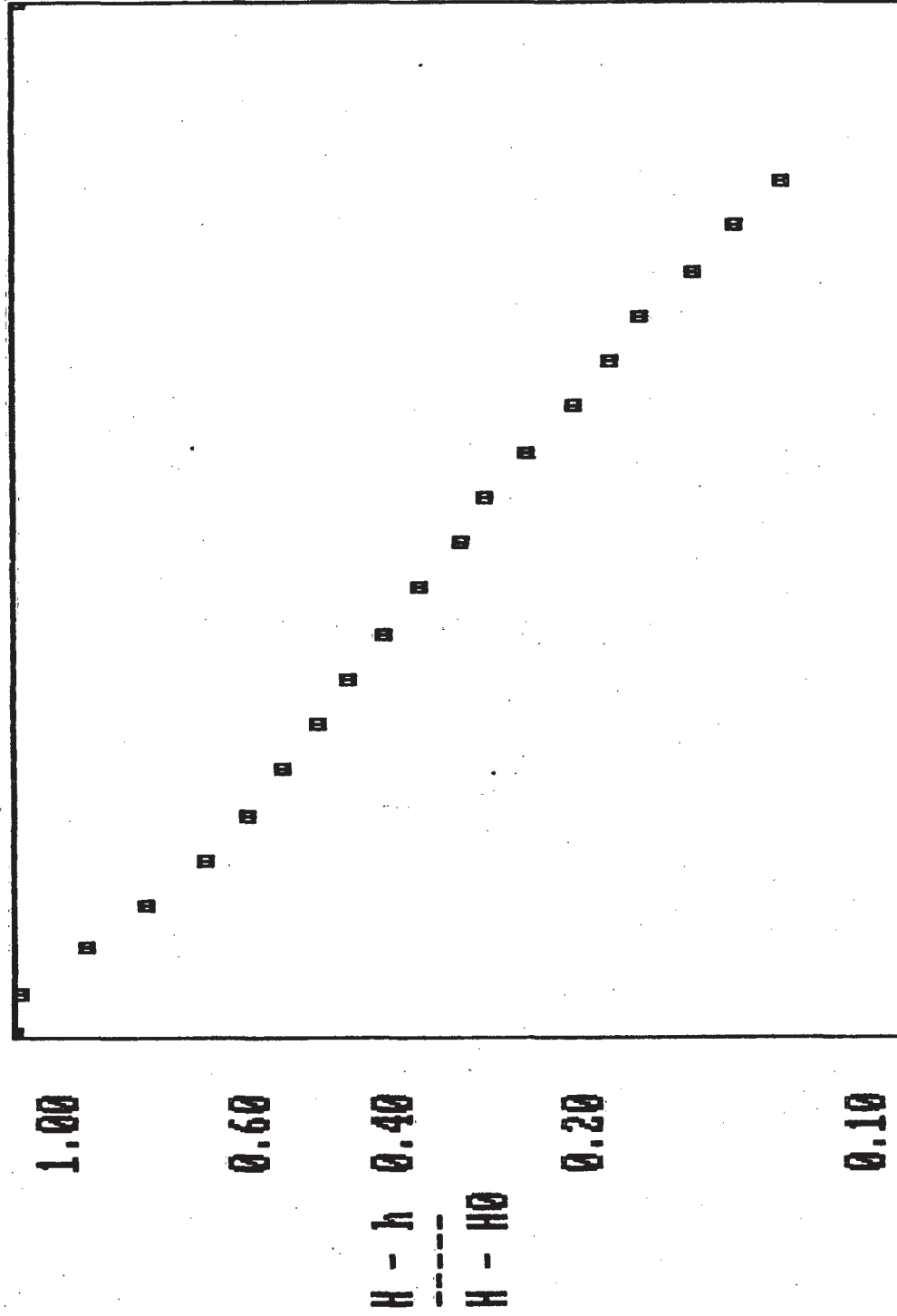
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Bacchus Works

Groundwater Quality Assessment
November 15, 1988

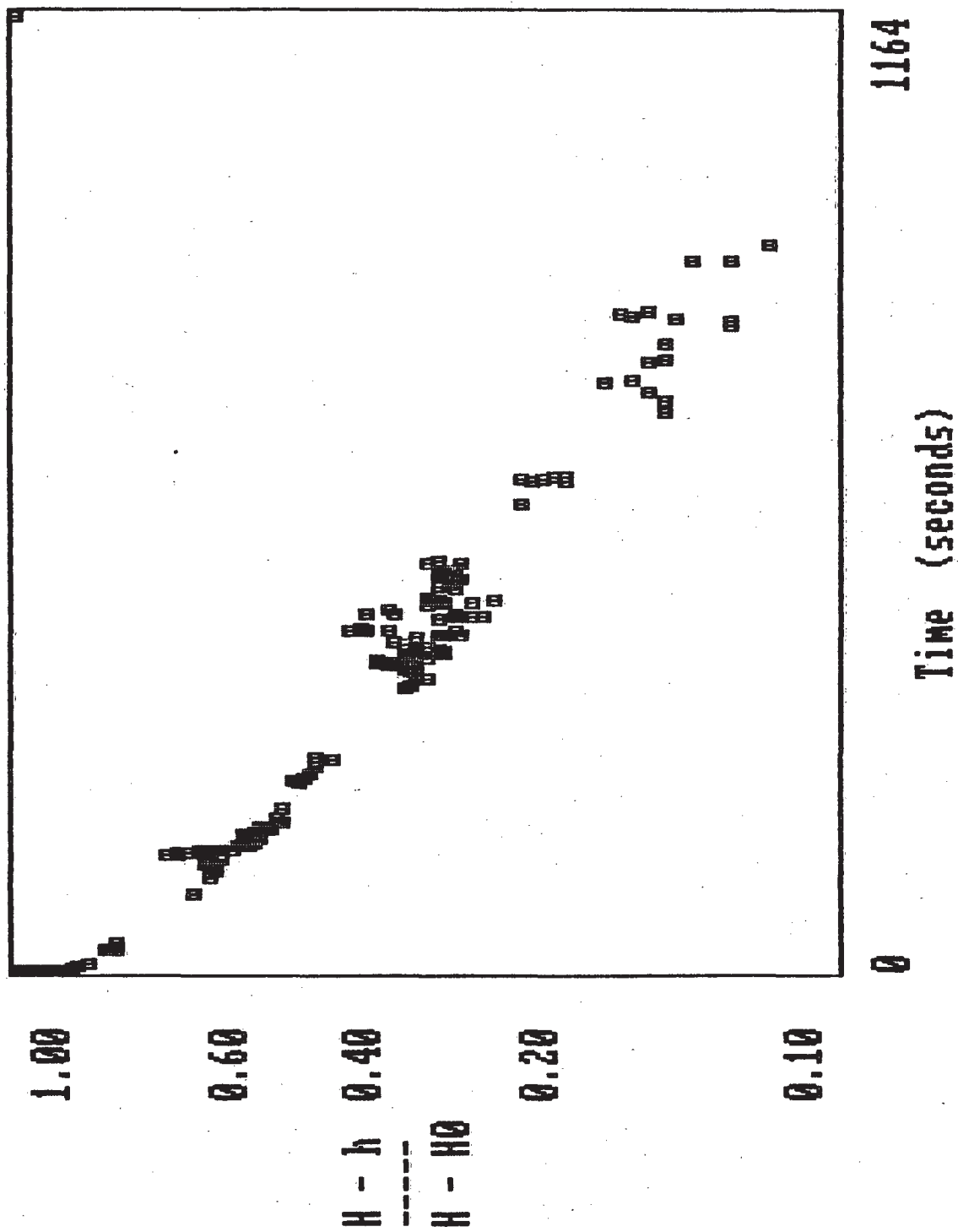
APPENDIX F

SLUG-TEST RESULTS

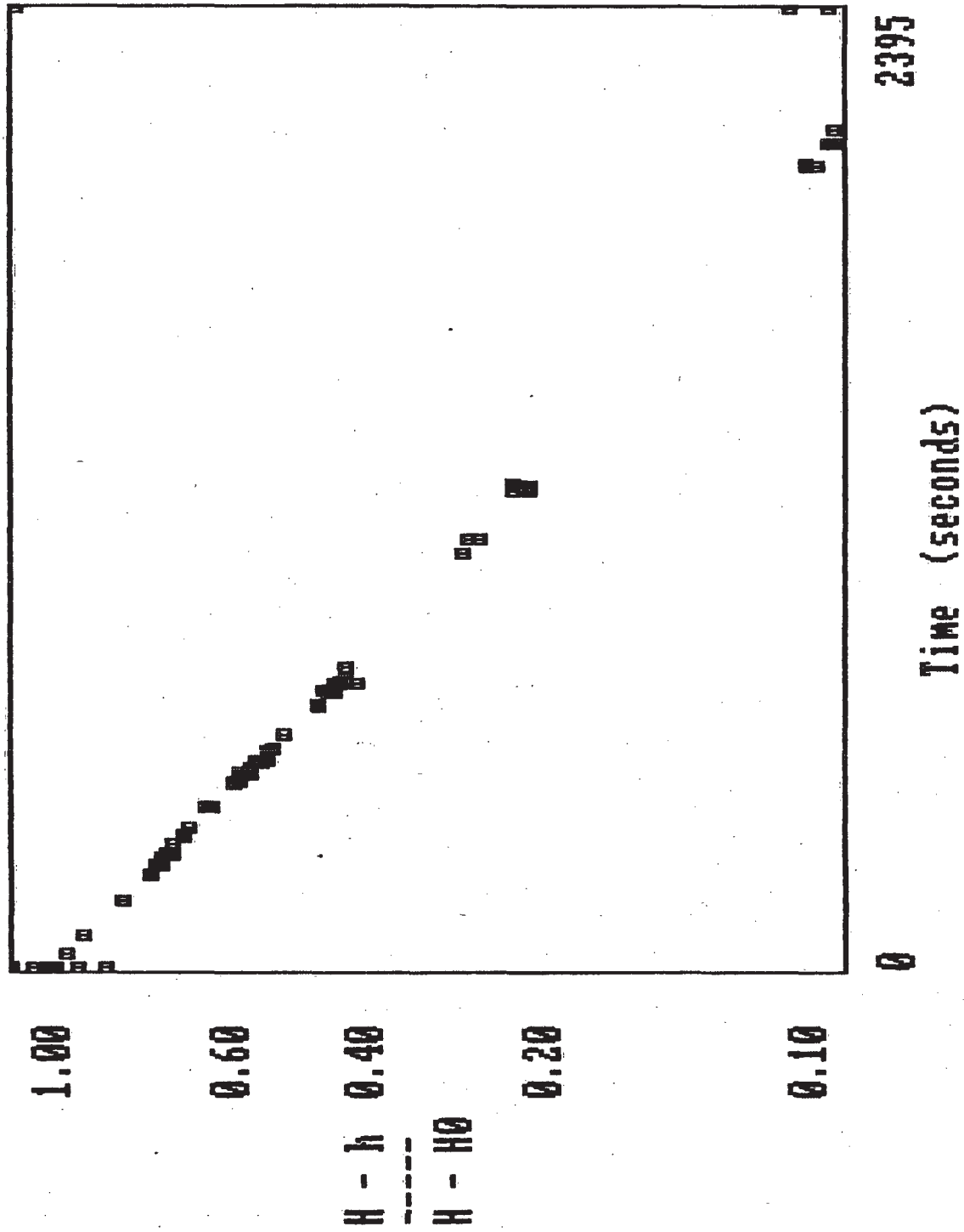
Bail Test: GW-1 TEST 2



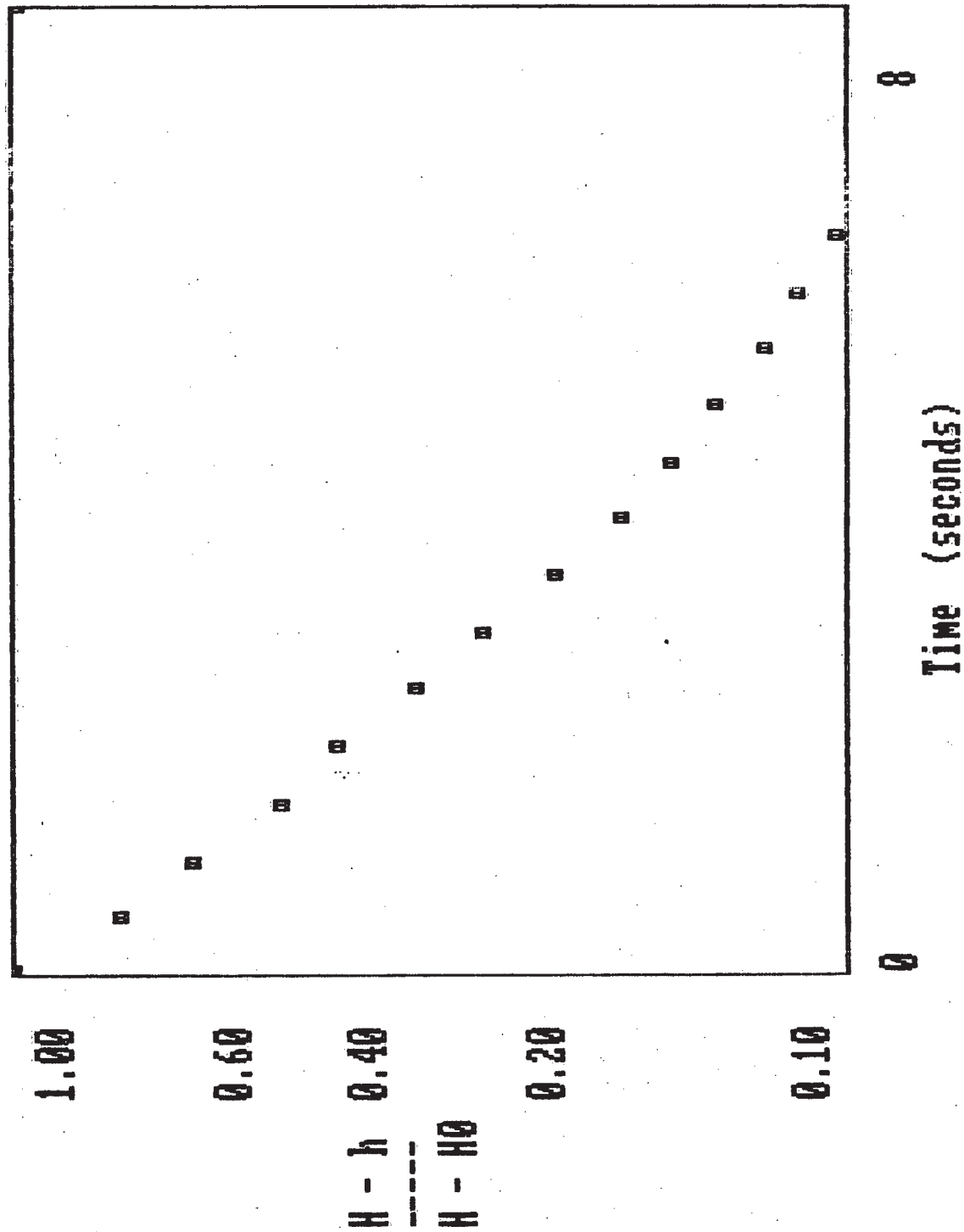
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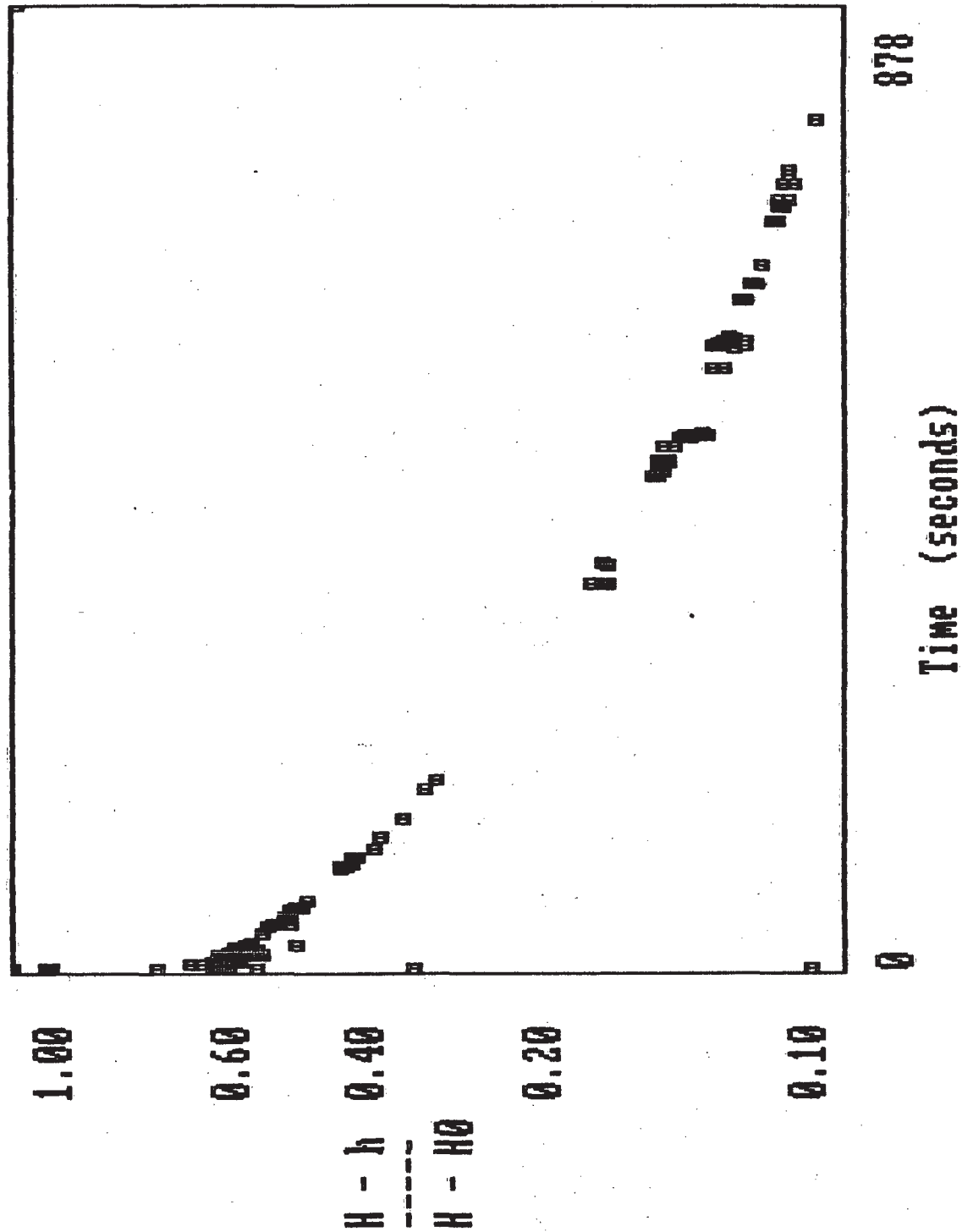
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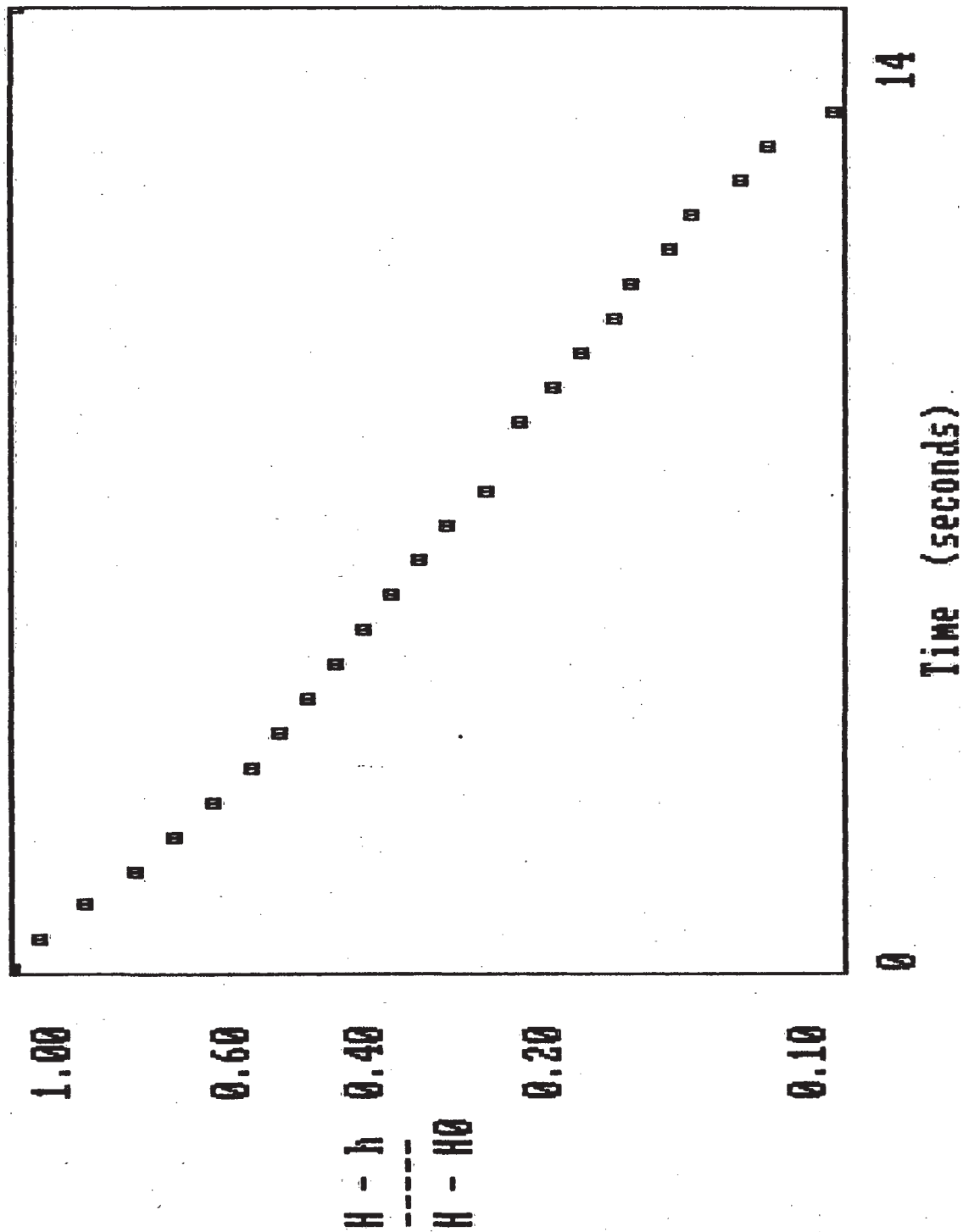
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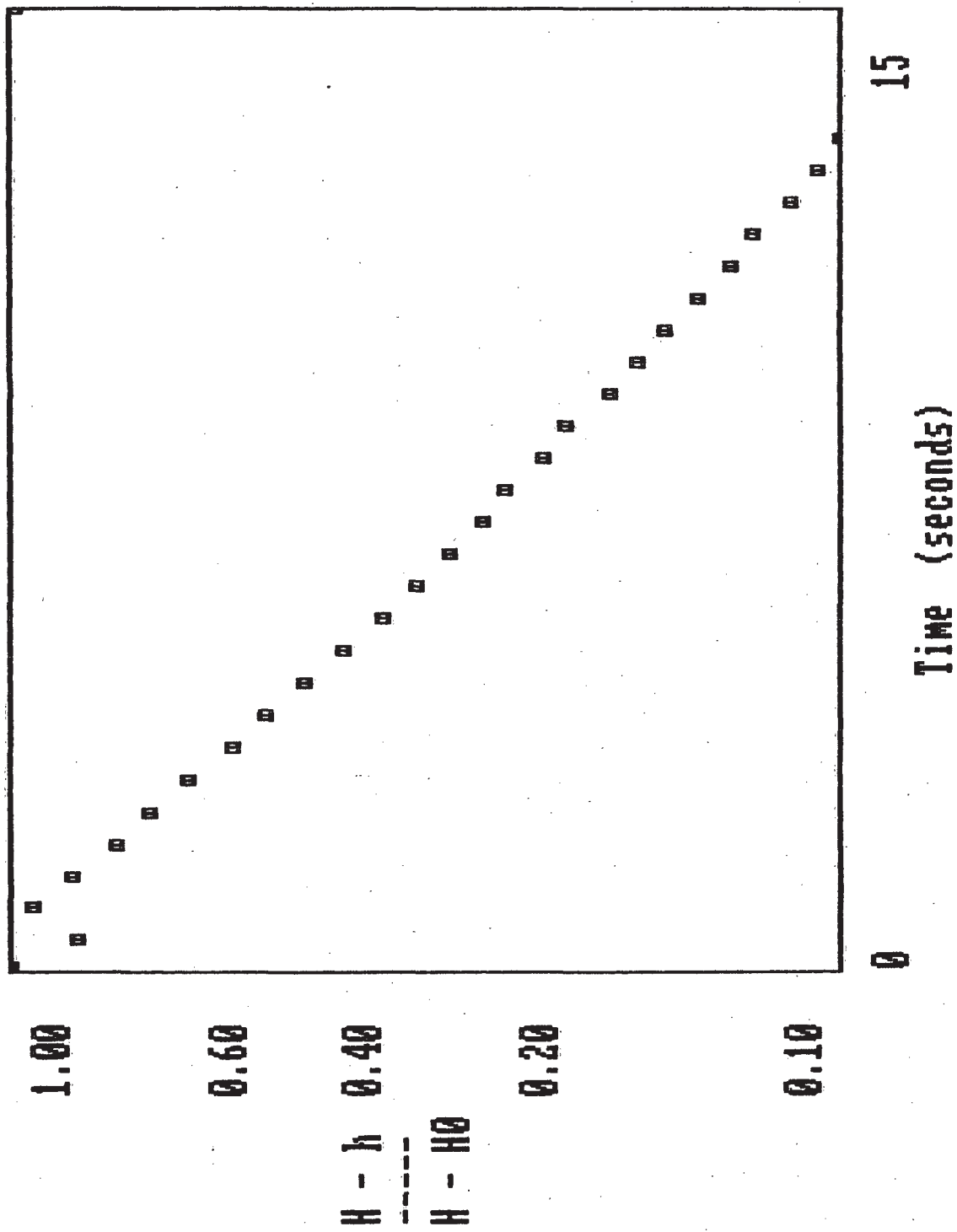
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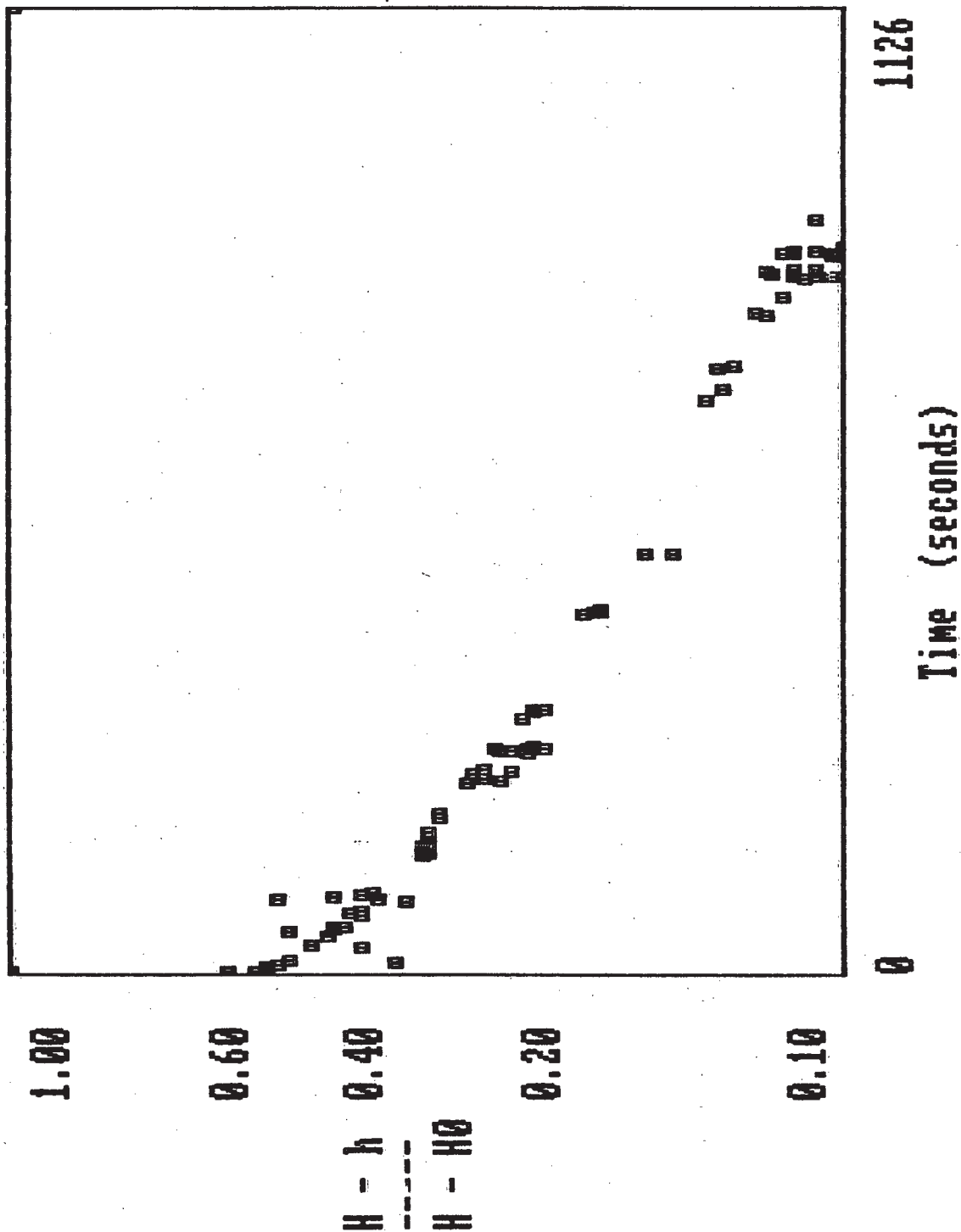
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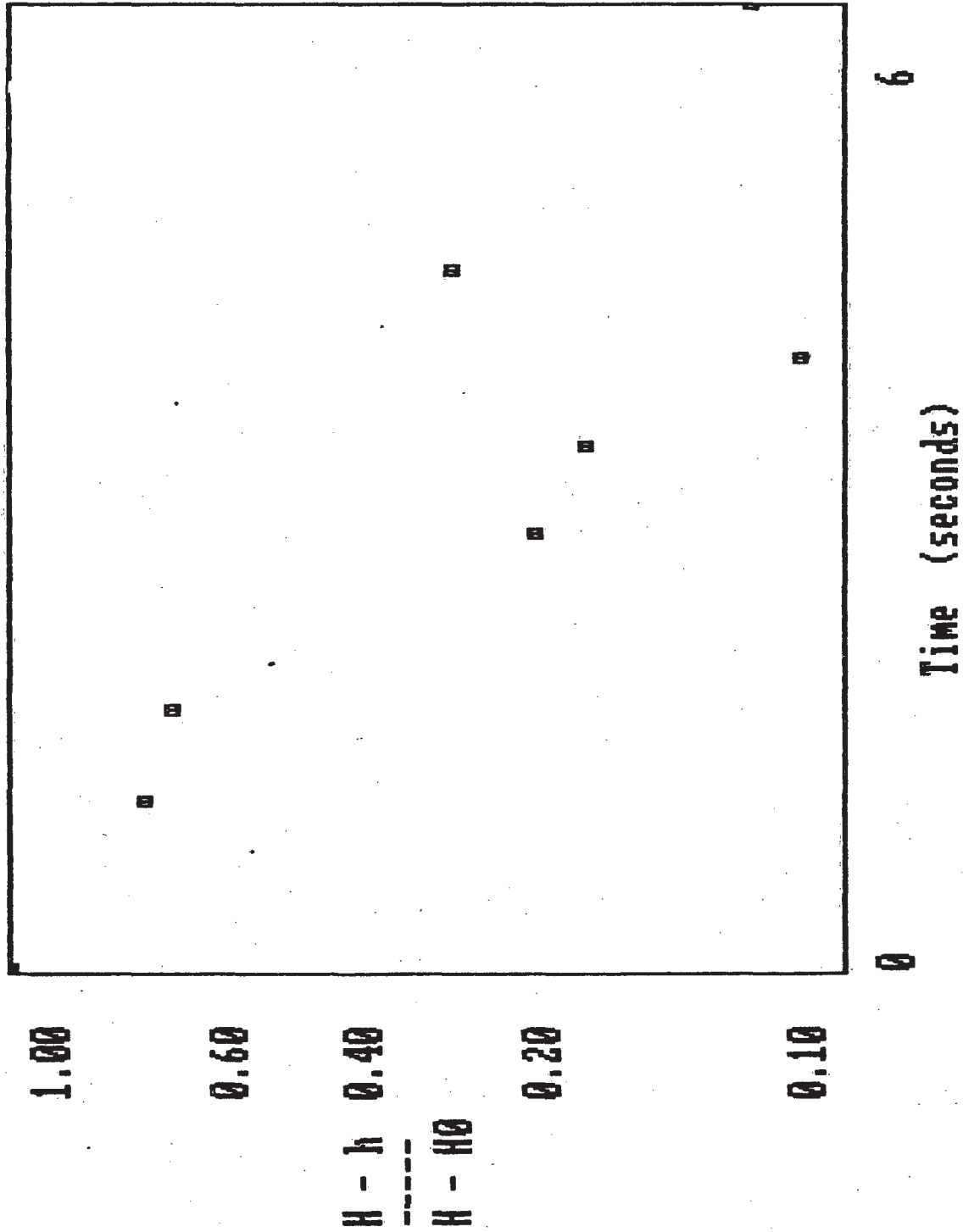
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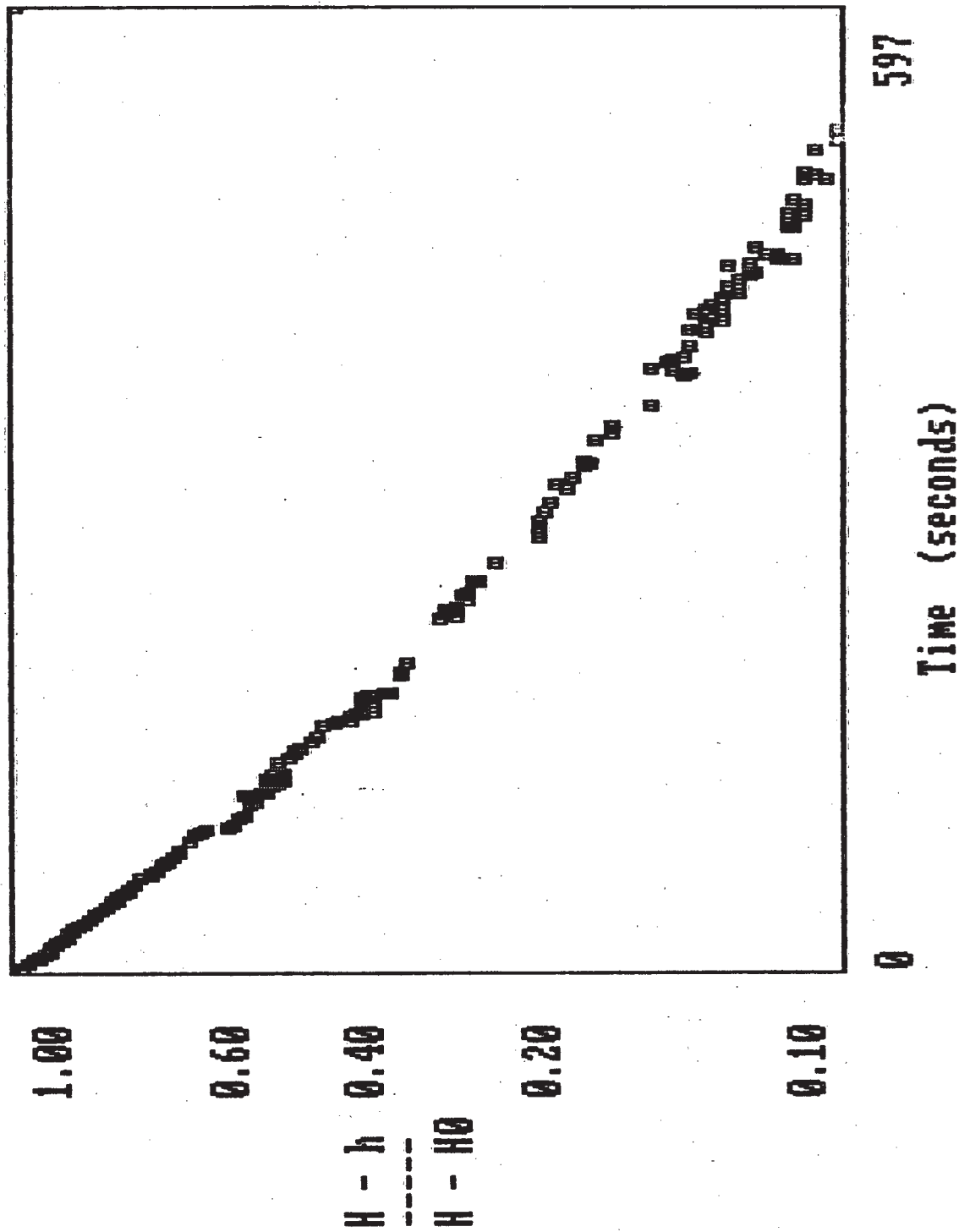
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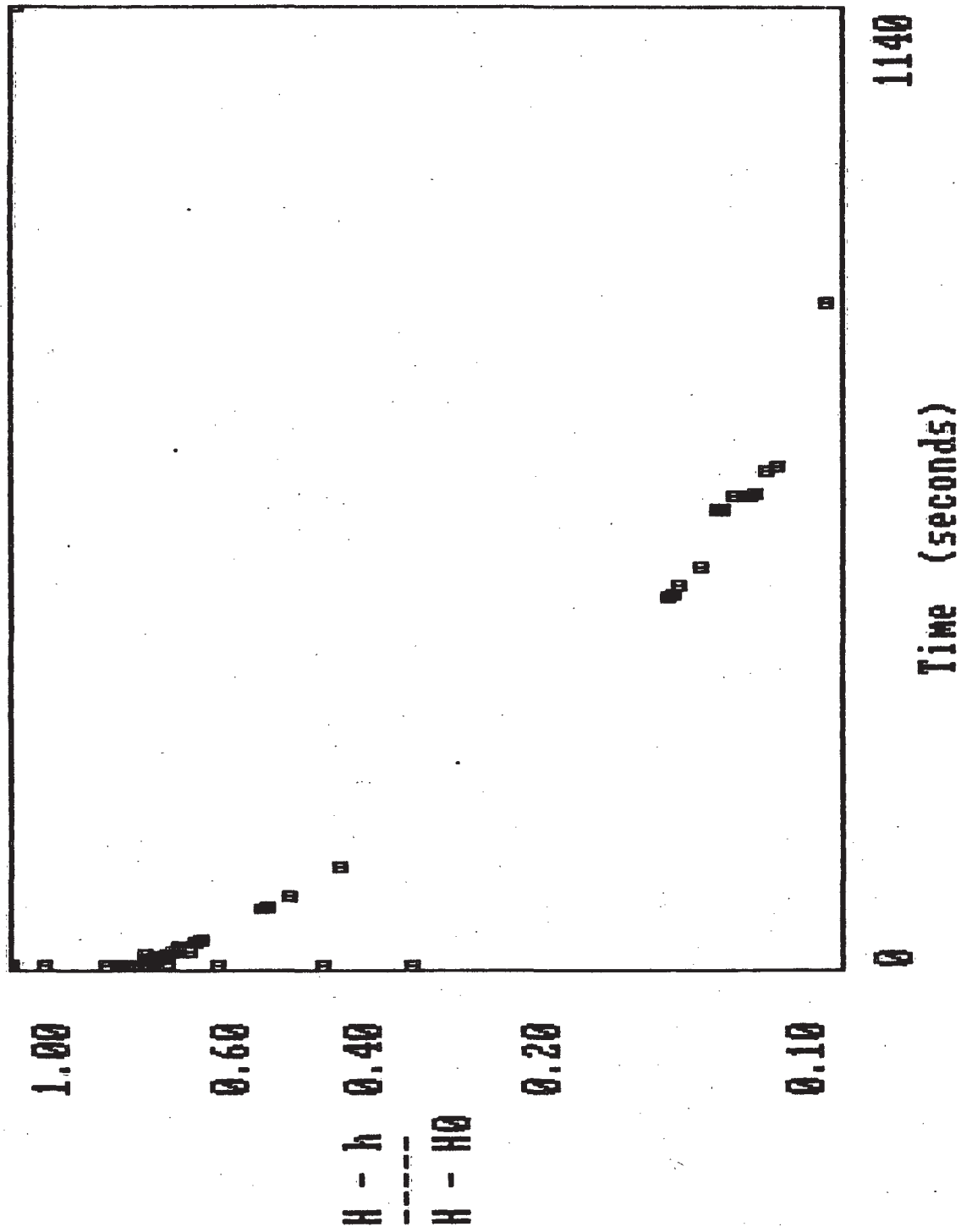
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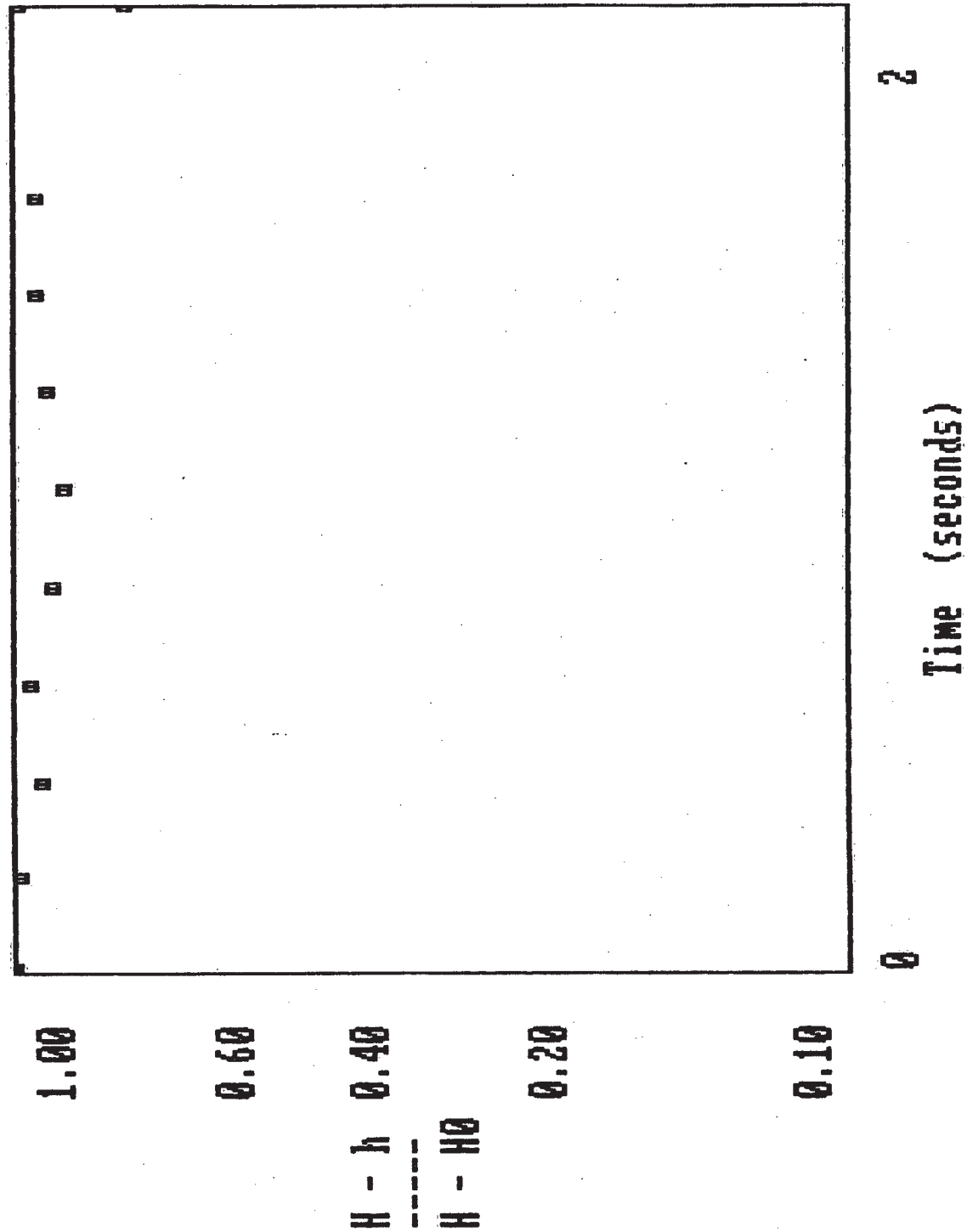
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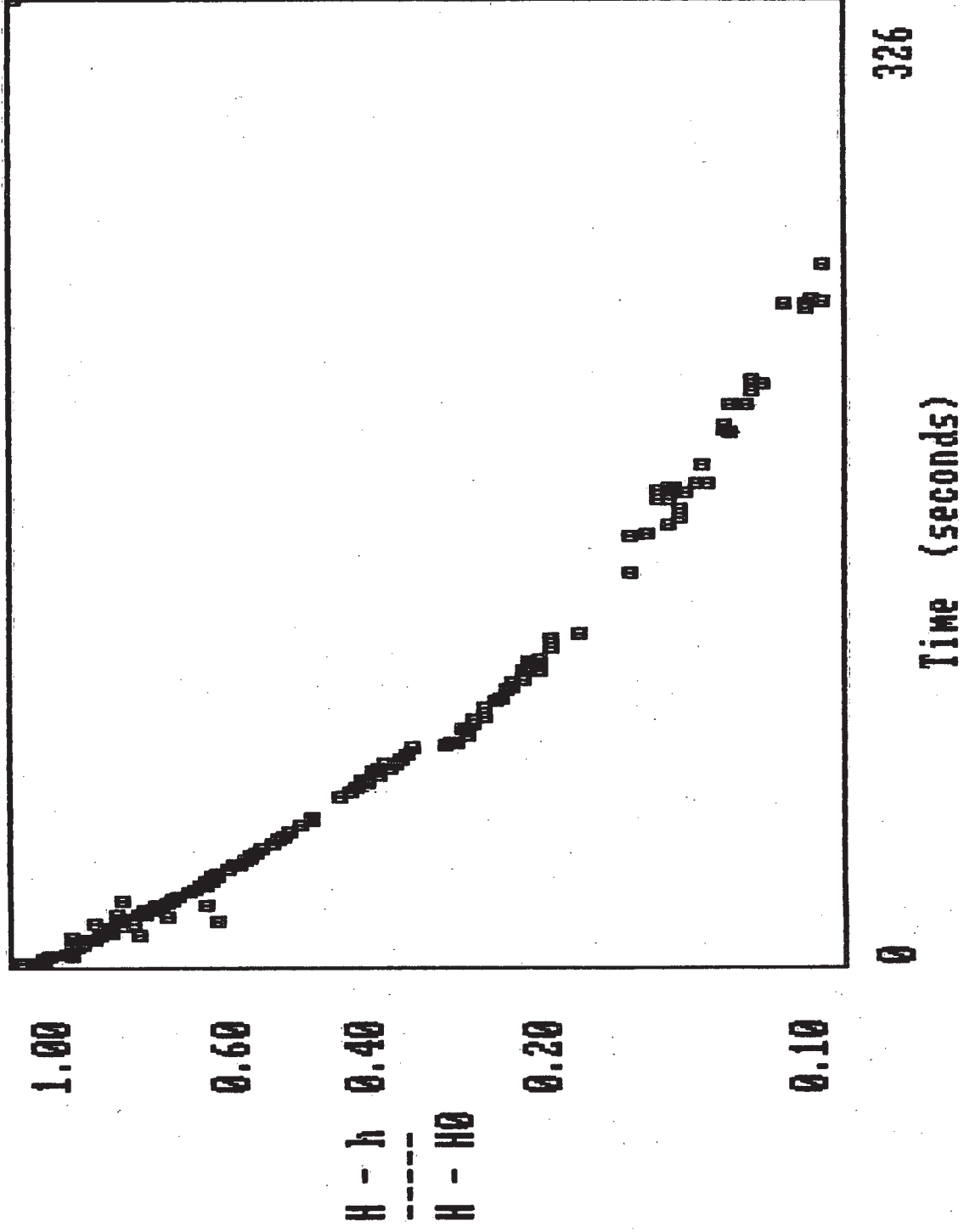
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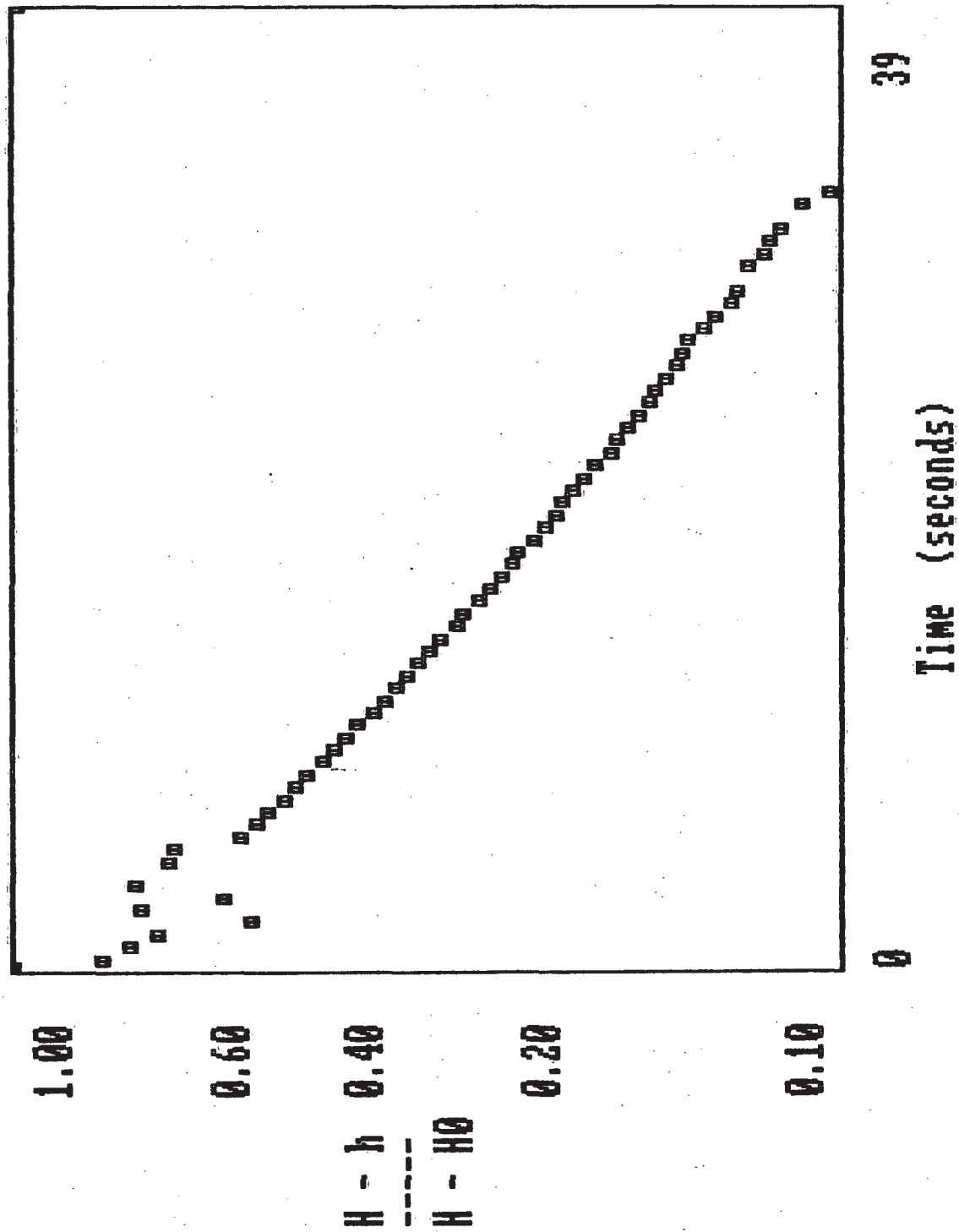
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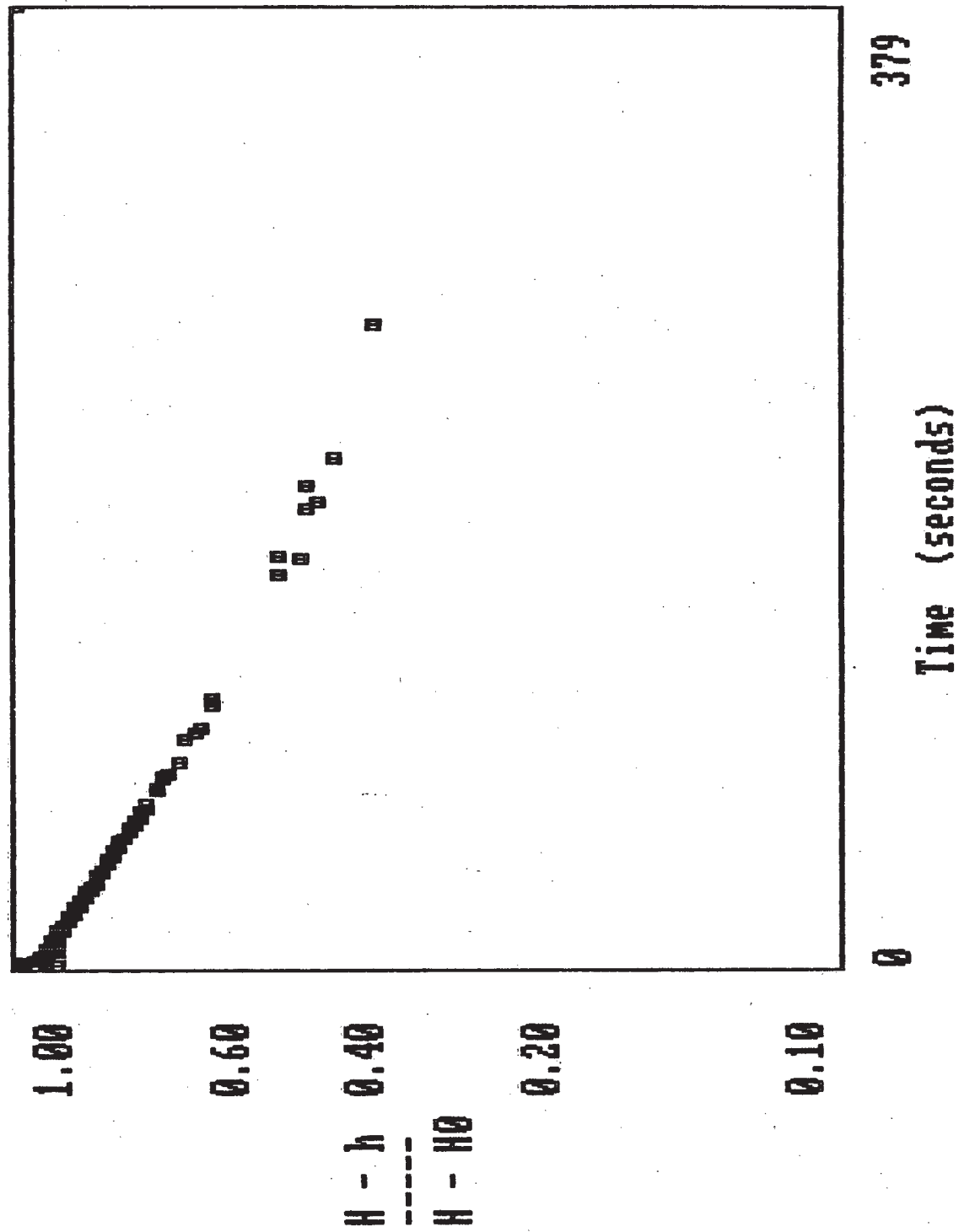
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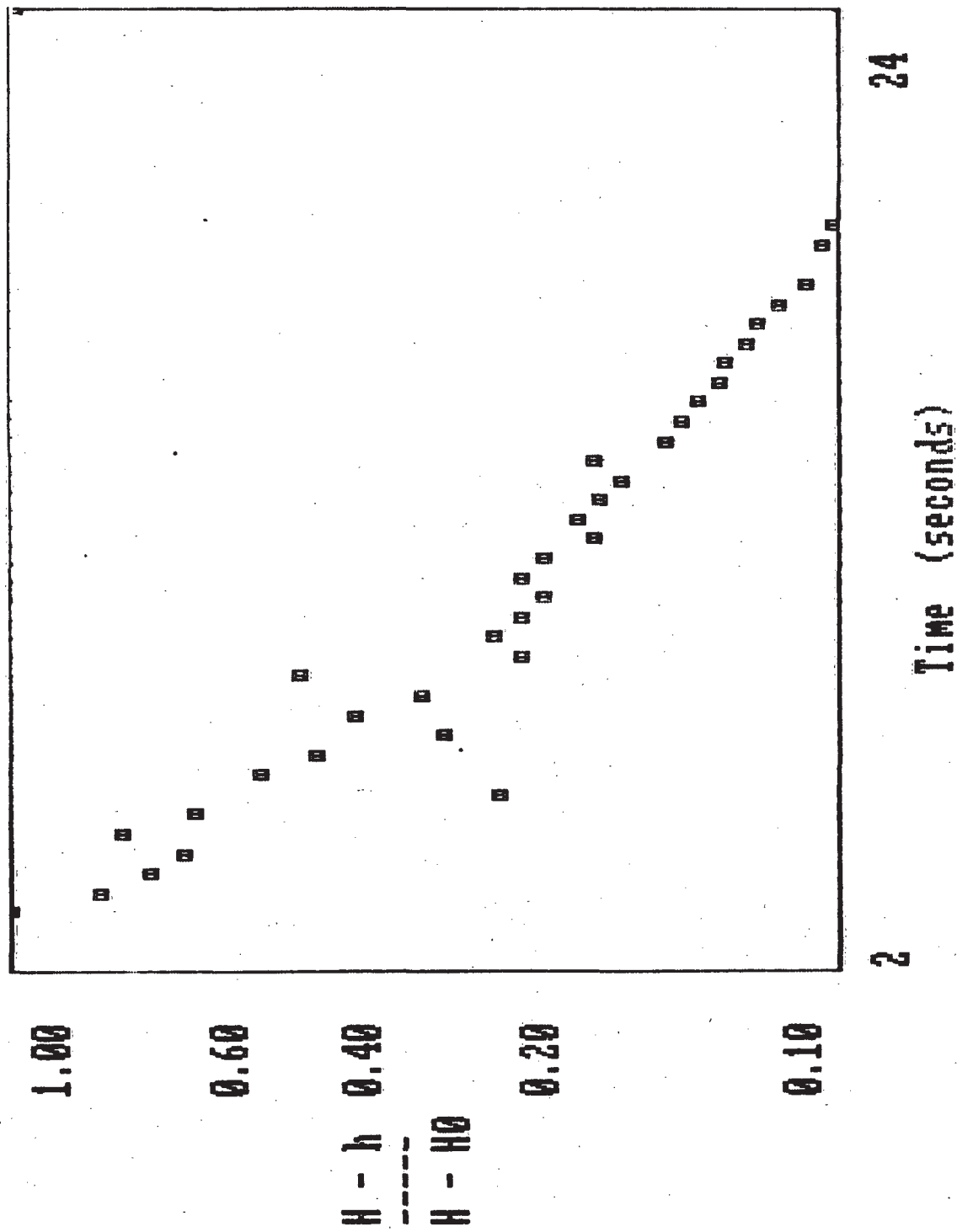
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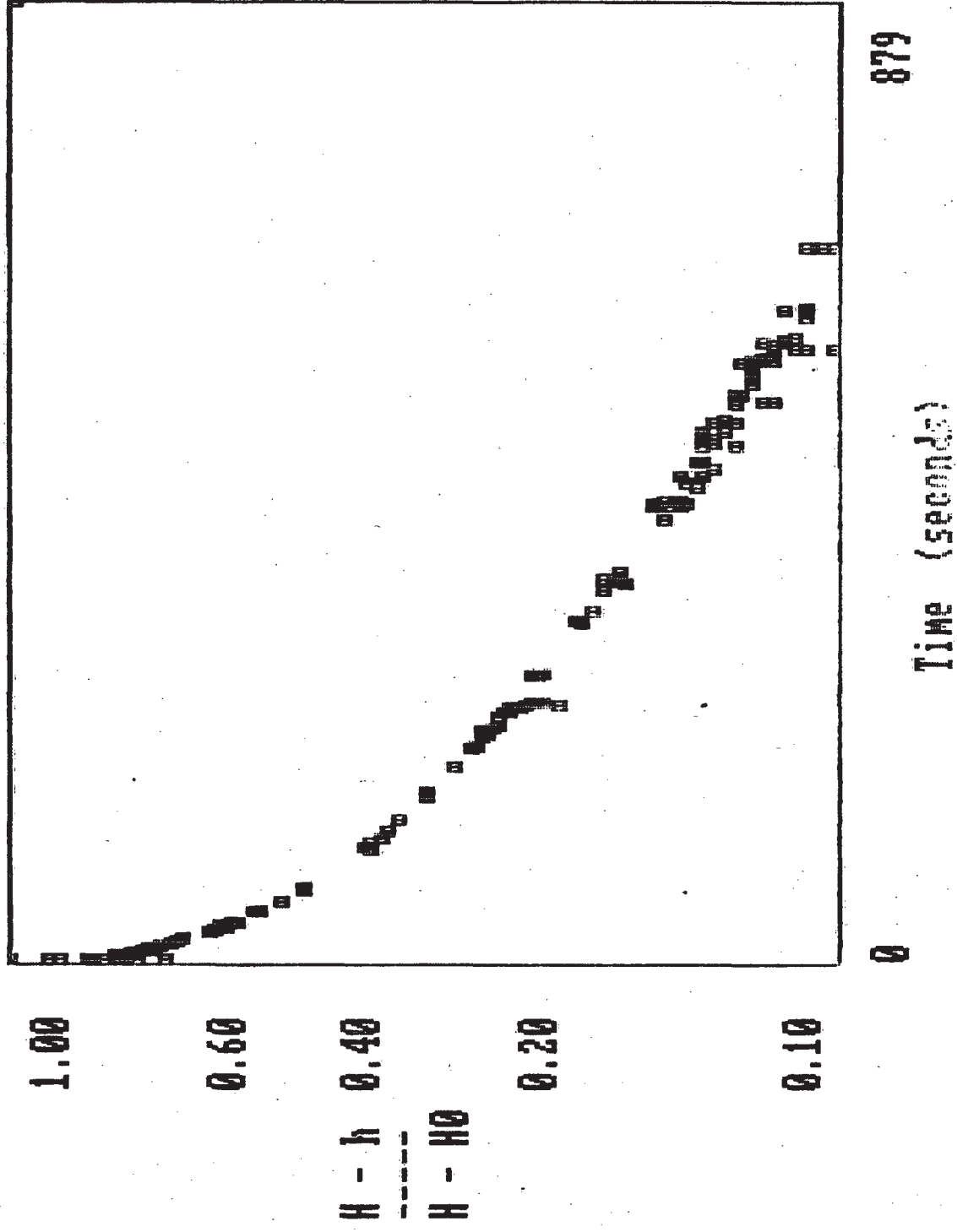
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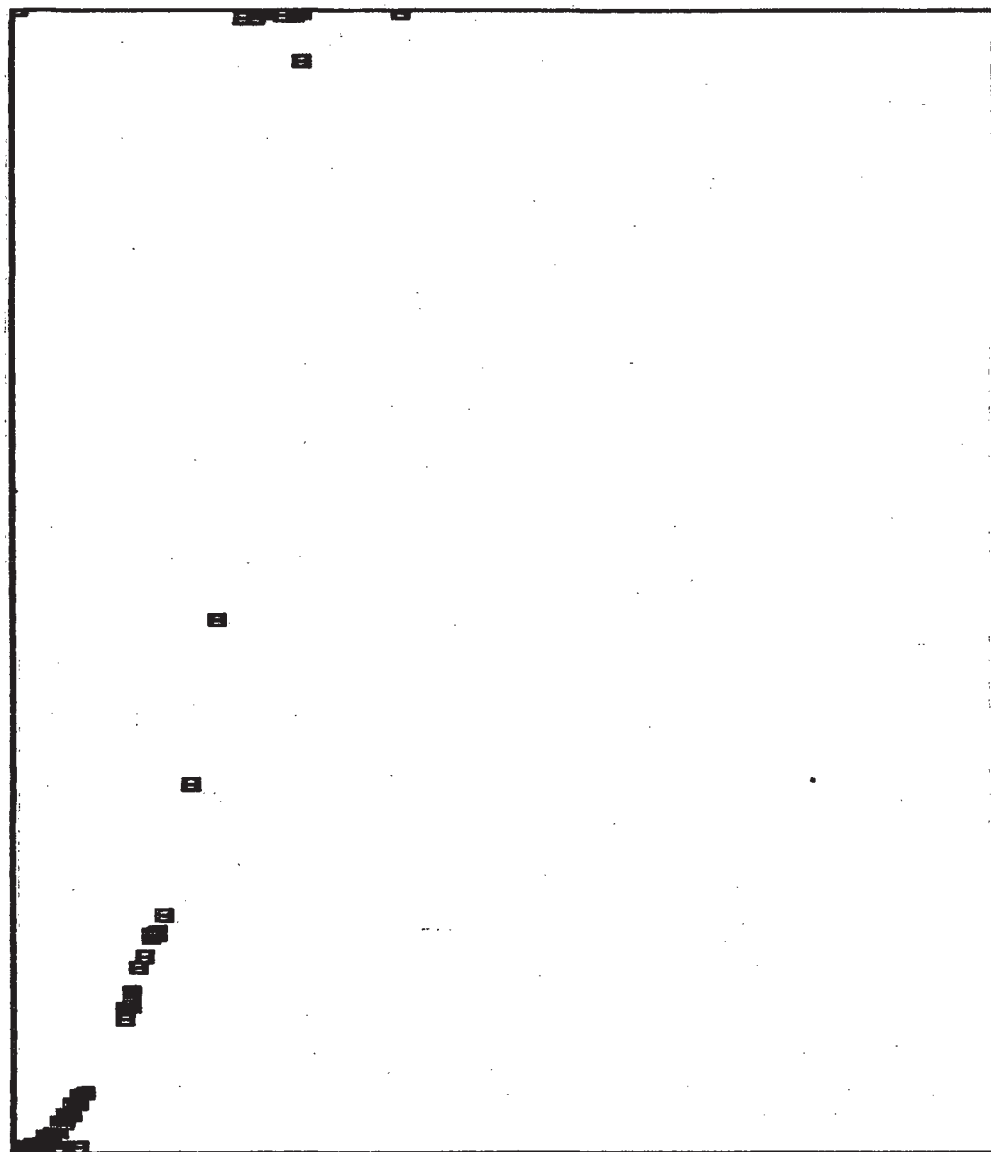
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slug Test: GH-17 "A" 11.4



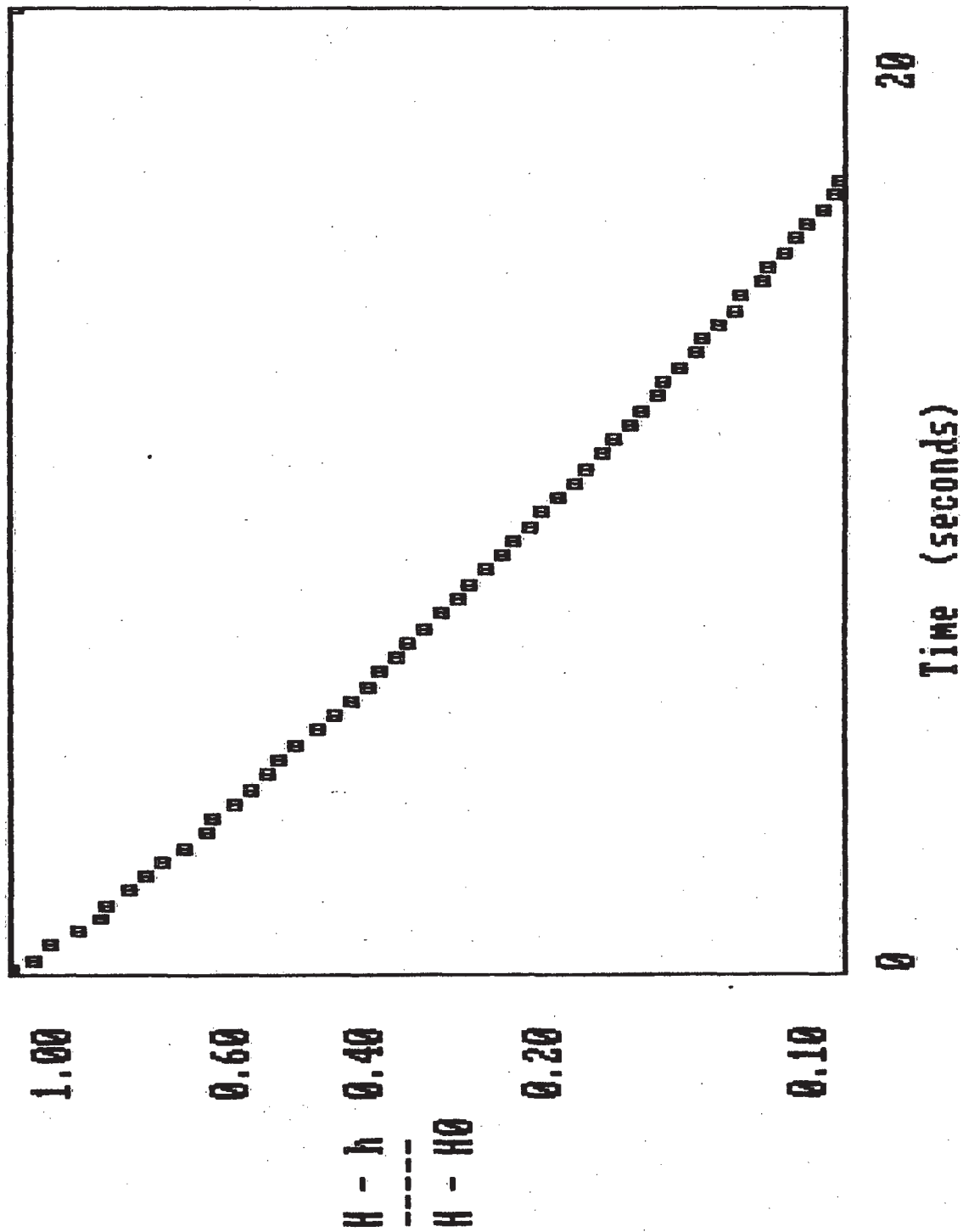
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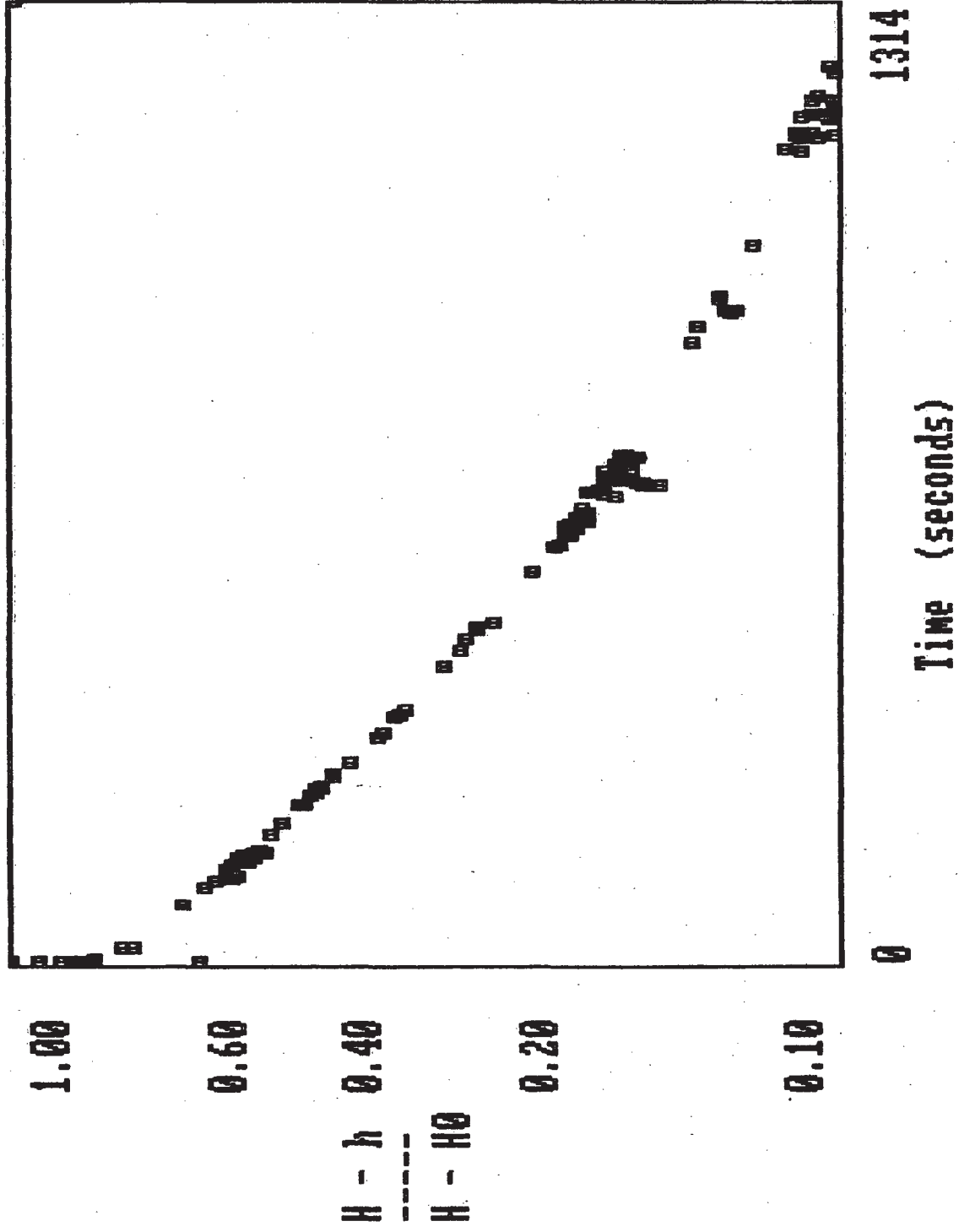
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Time (seconds)

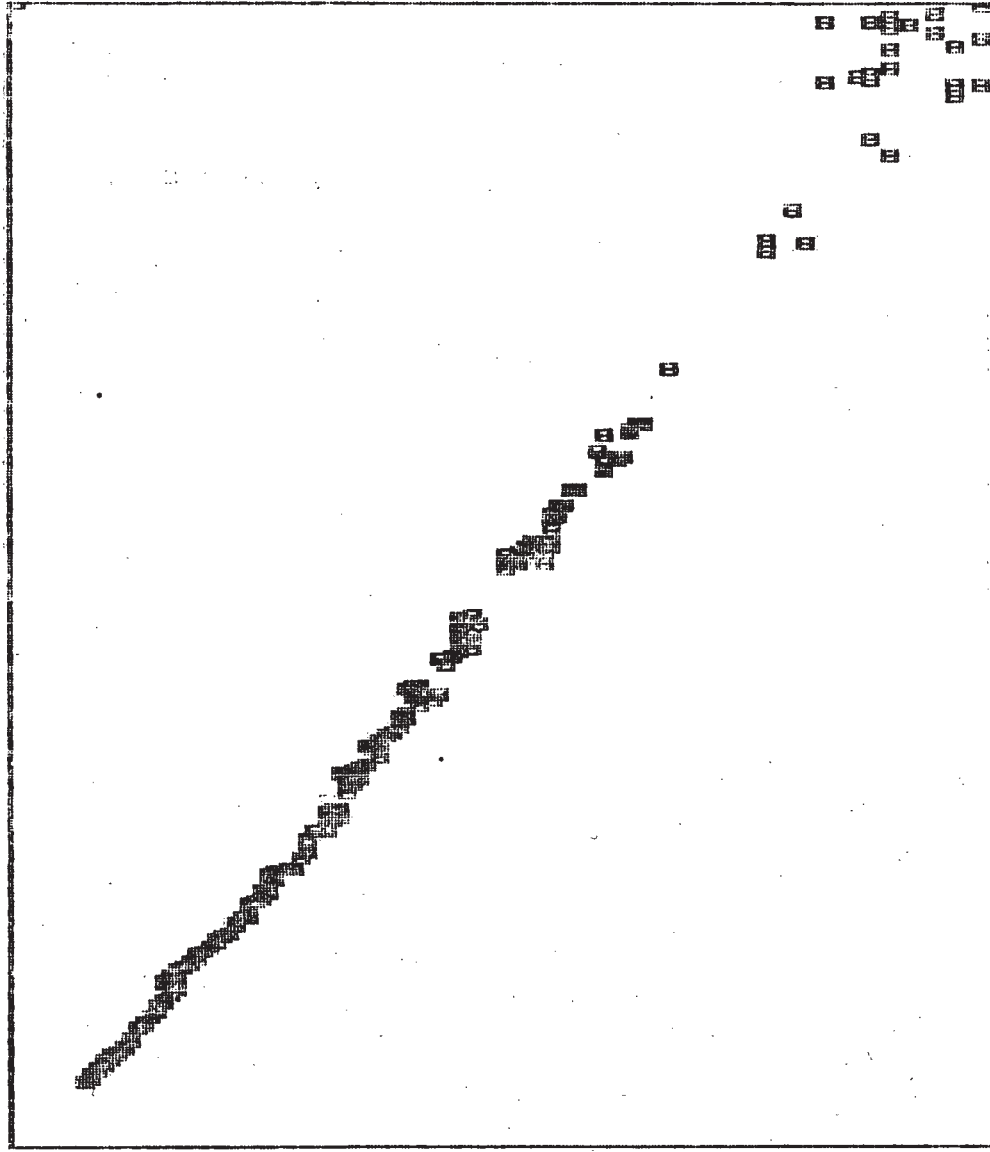
Bail Test: GW-19 Test 2



Slug Test: GW-20 Test 1



Bail Test: GW-21 Test 2

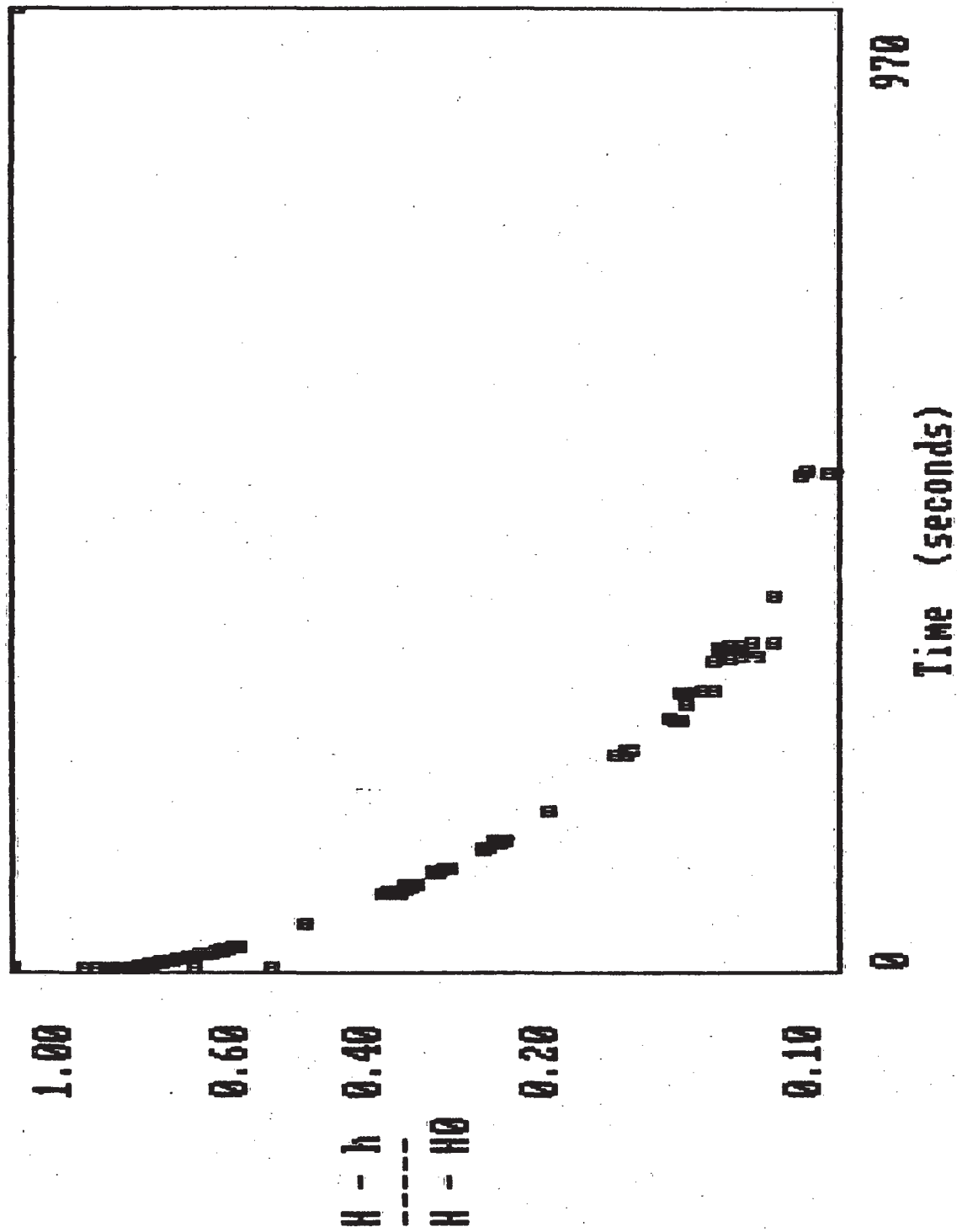


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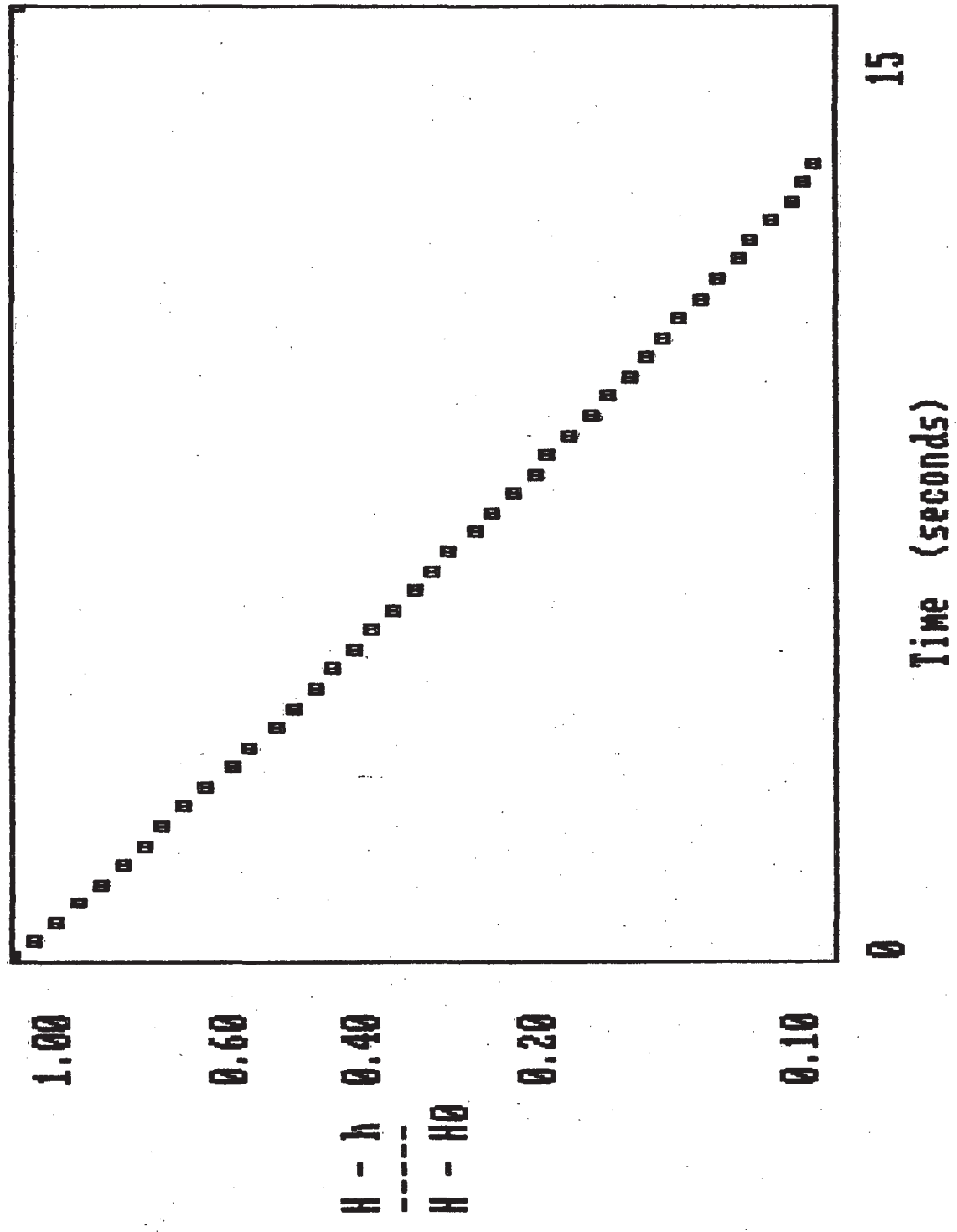
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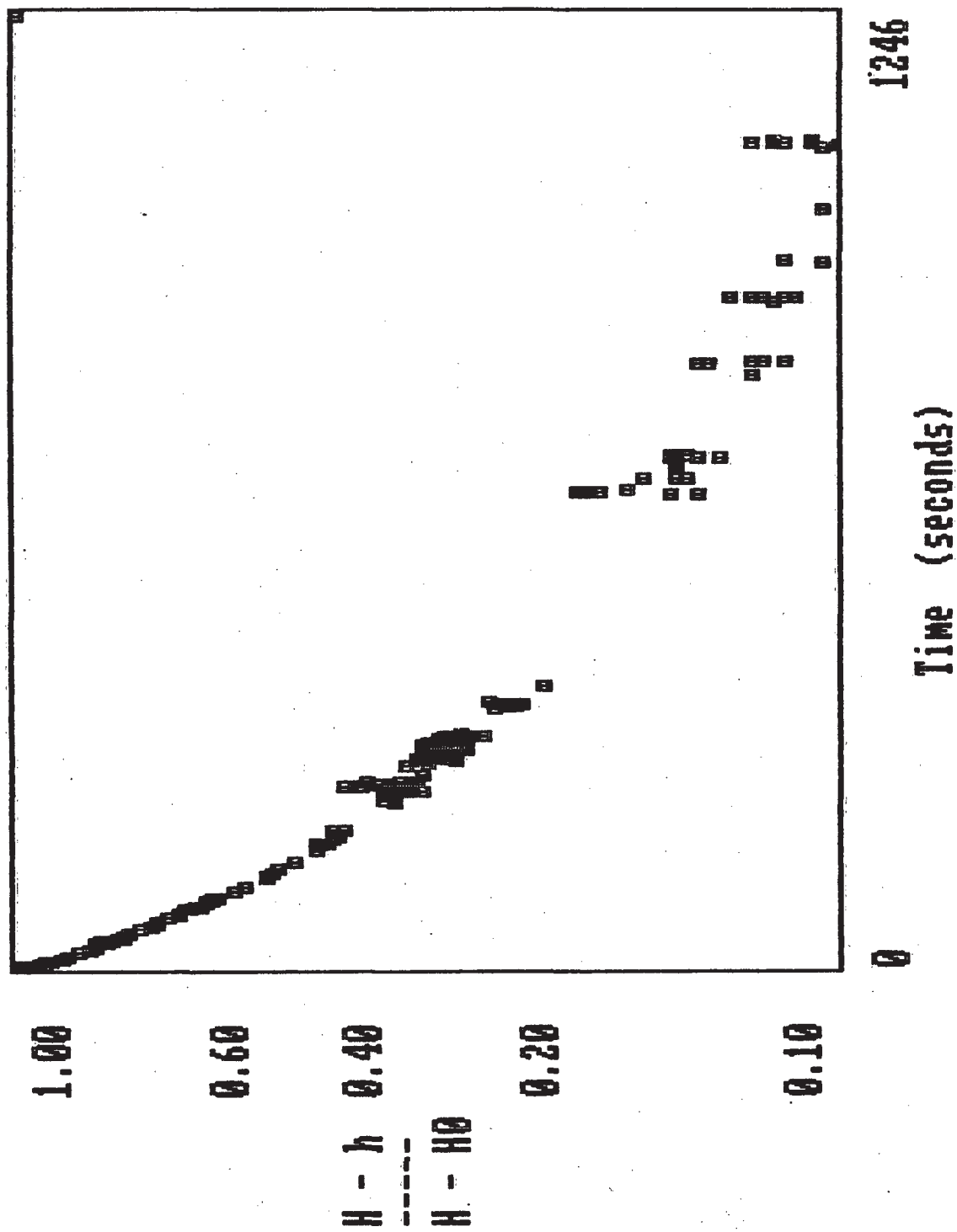
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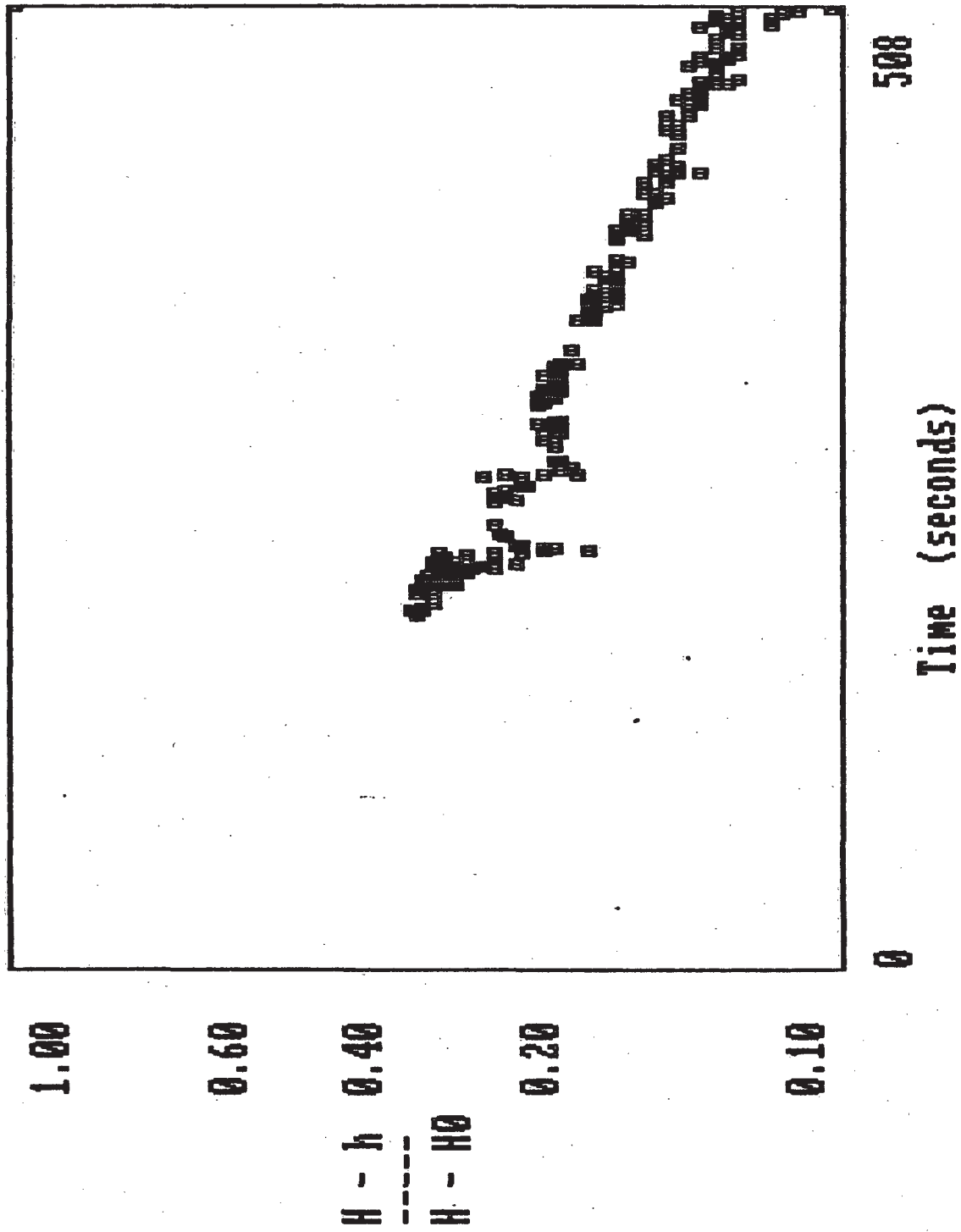
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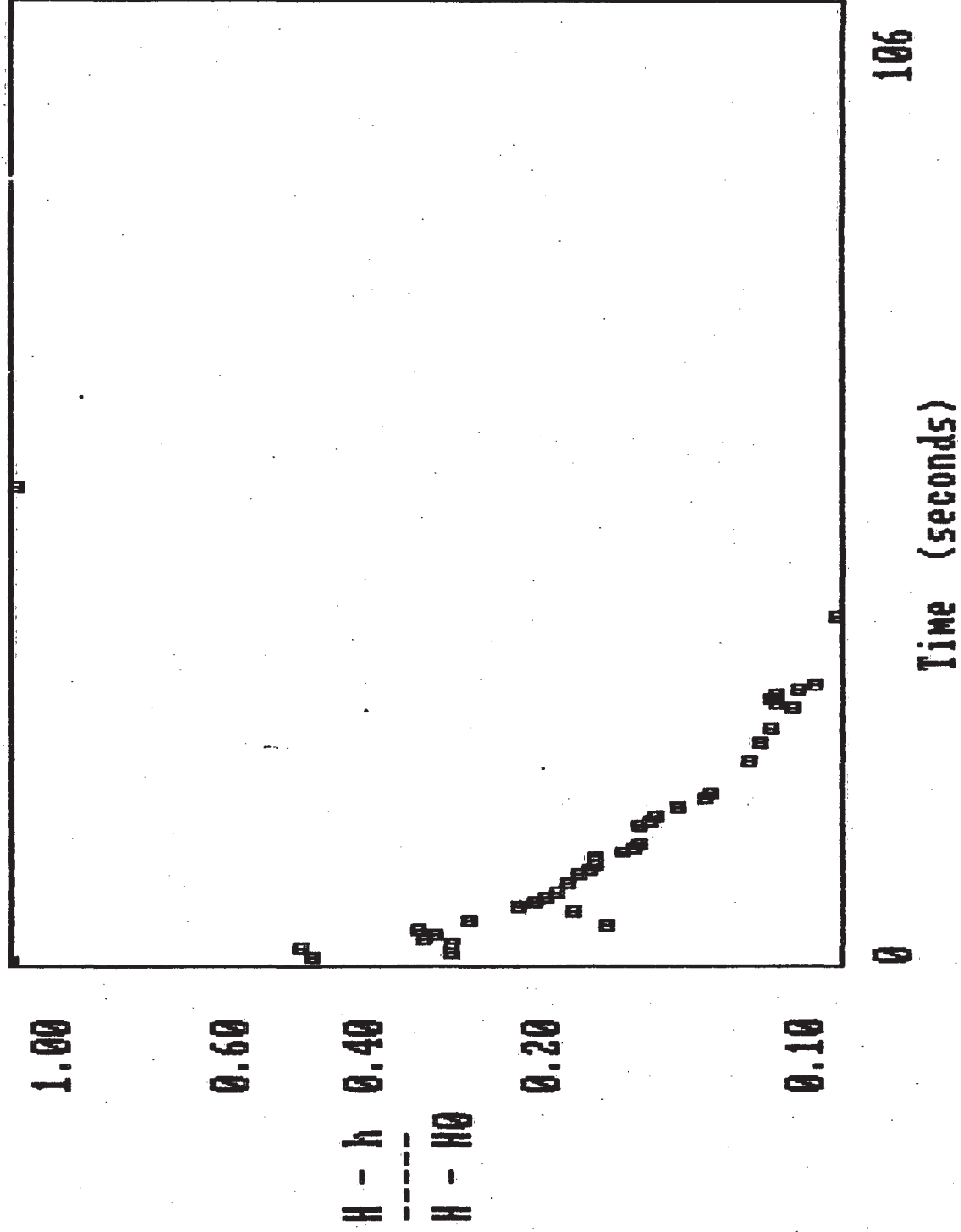
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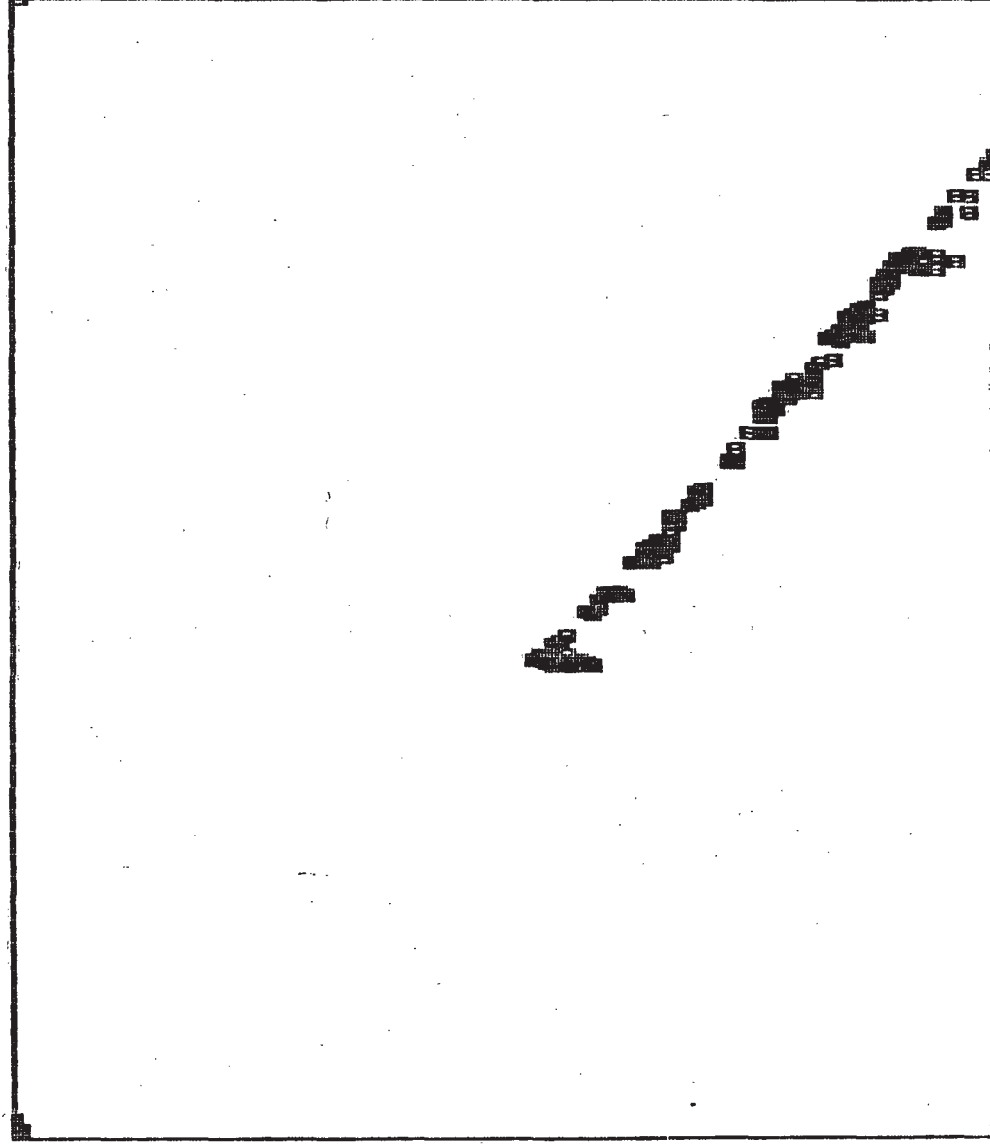
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Slug Test: GW-26 Test 1



Slug Test: GW-27 Test 1B



2301

Time (seconds)

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0.60

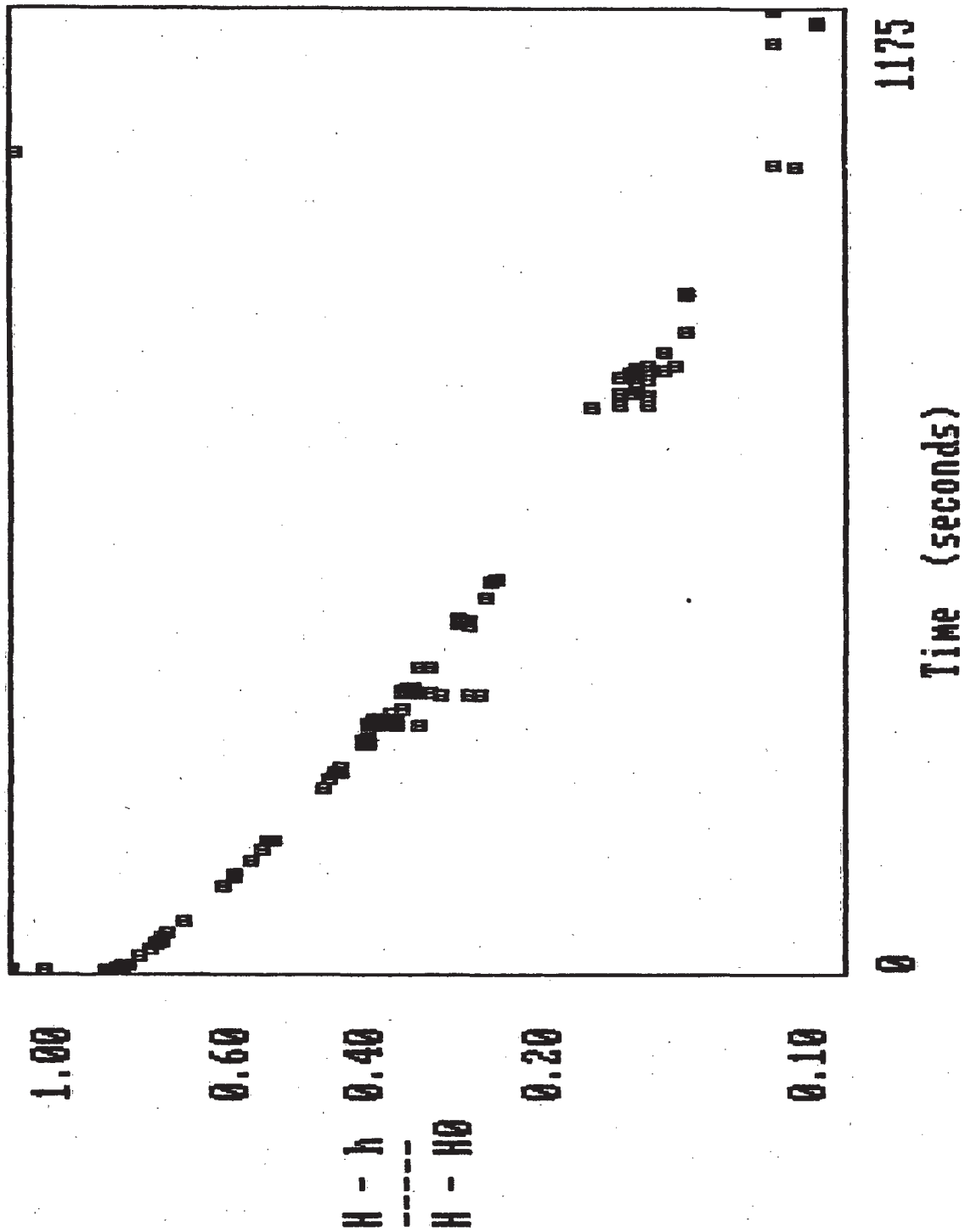
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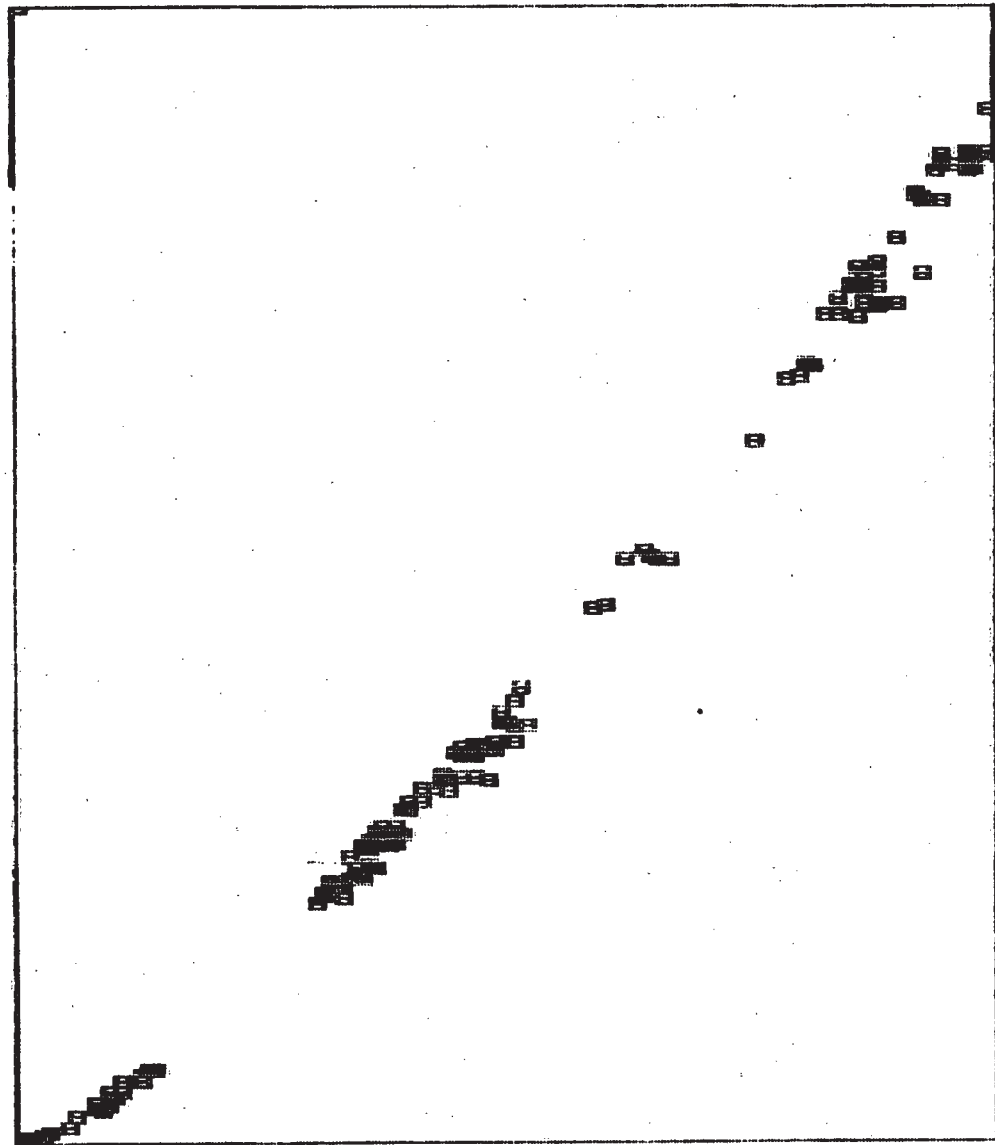
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$\frac{h - h_0}{H - h_0}$

Slug Test: GW-28 TEST 1



Slug Test: GW-29 Test 1

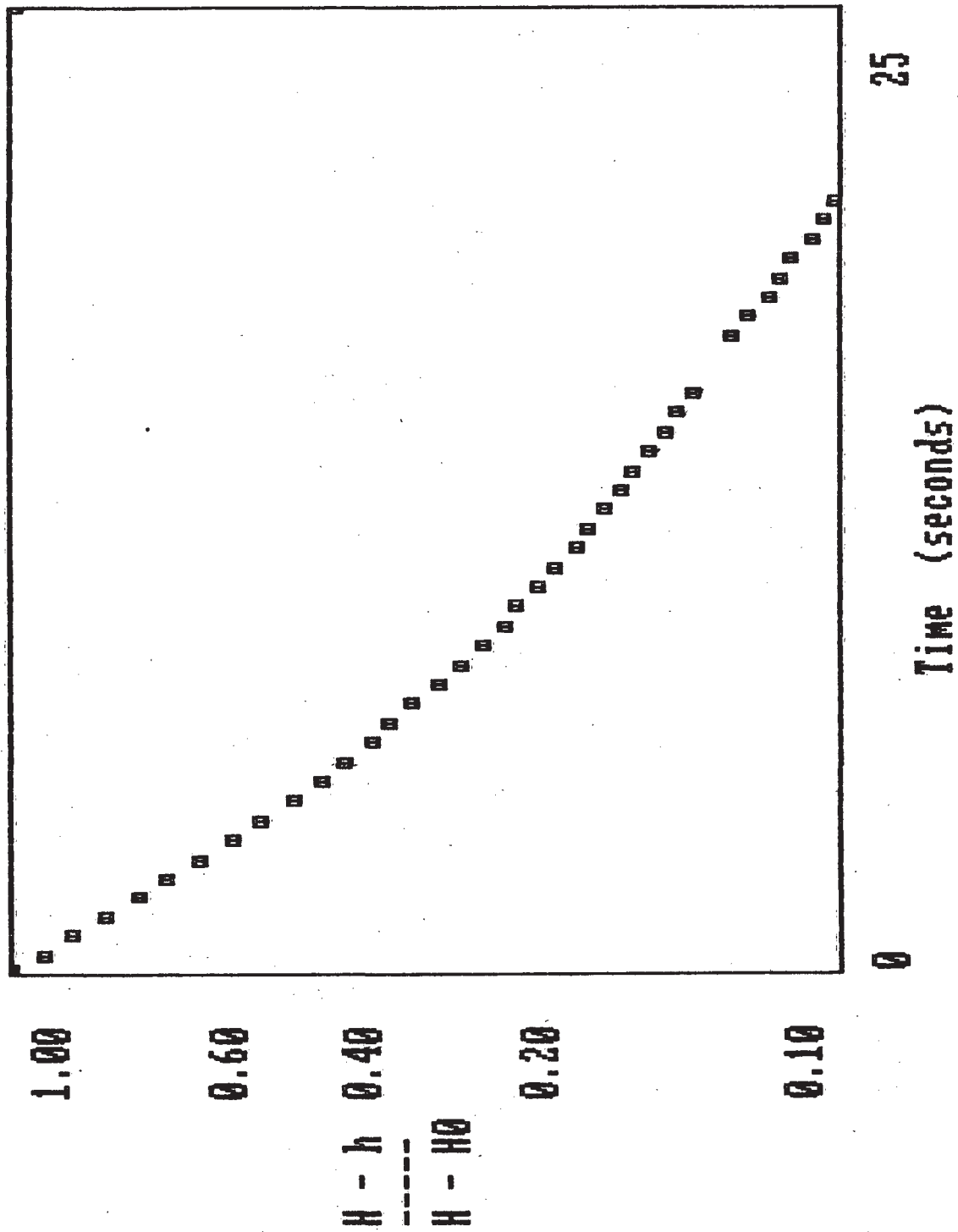


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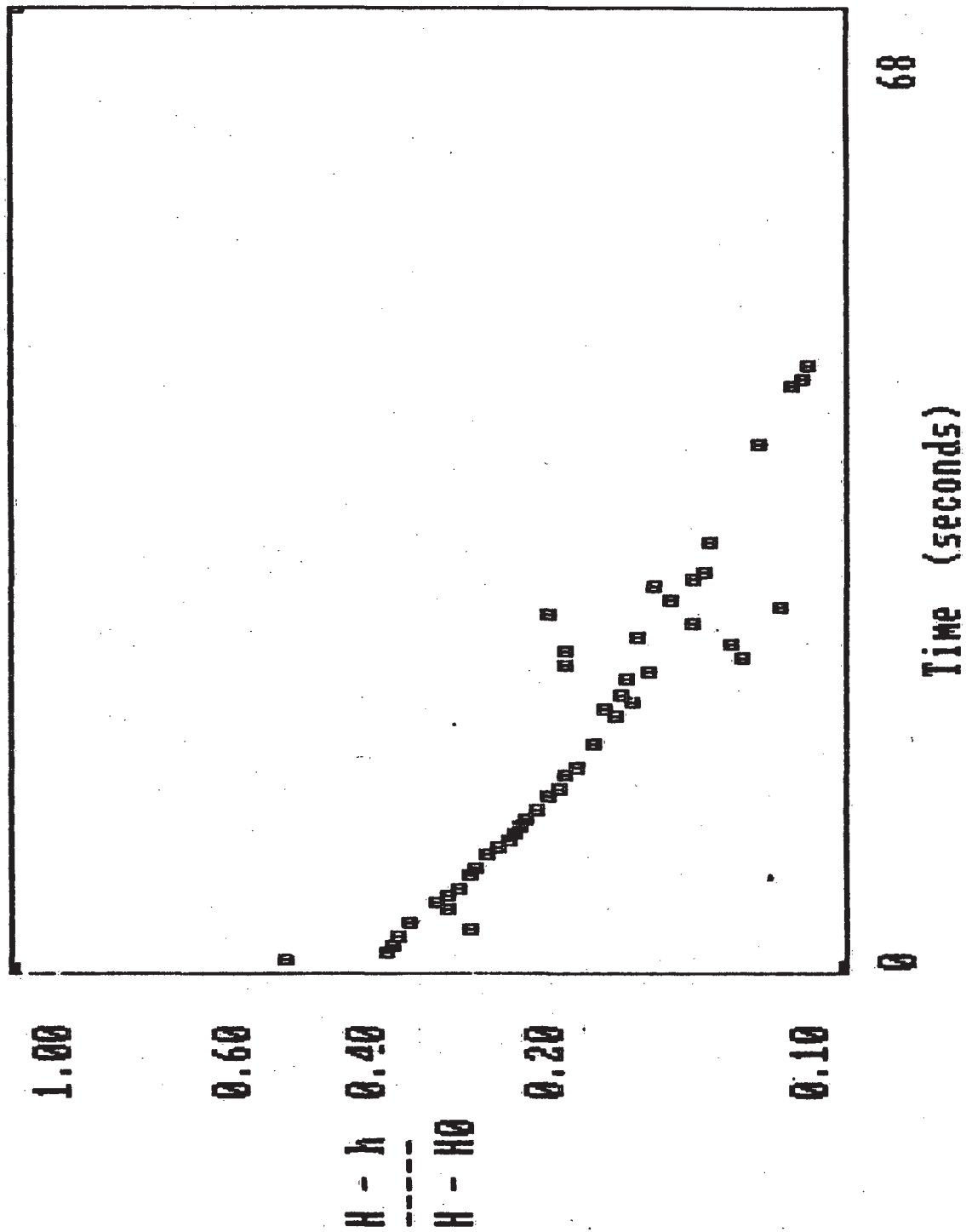
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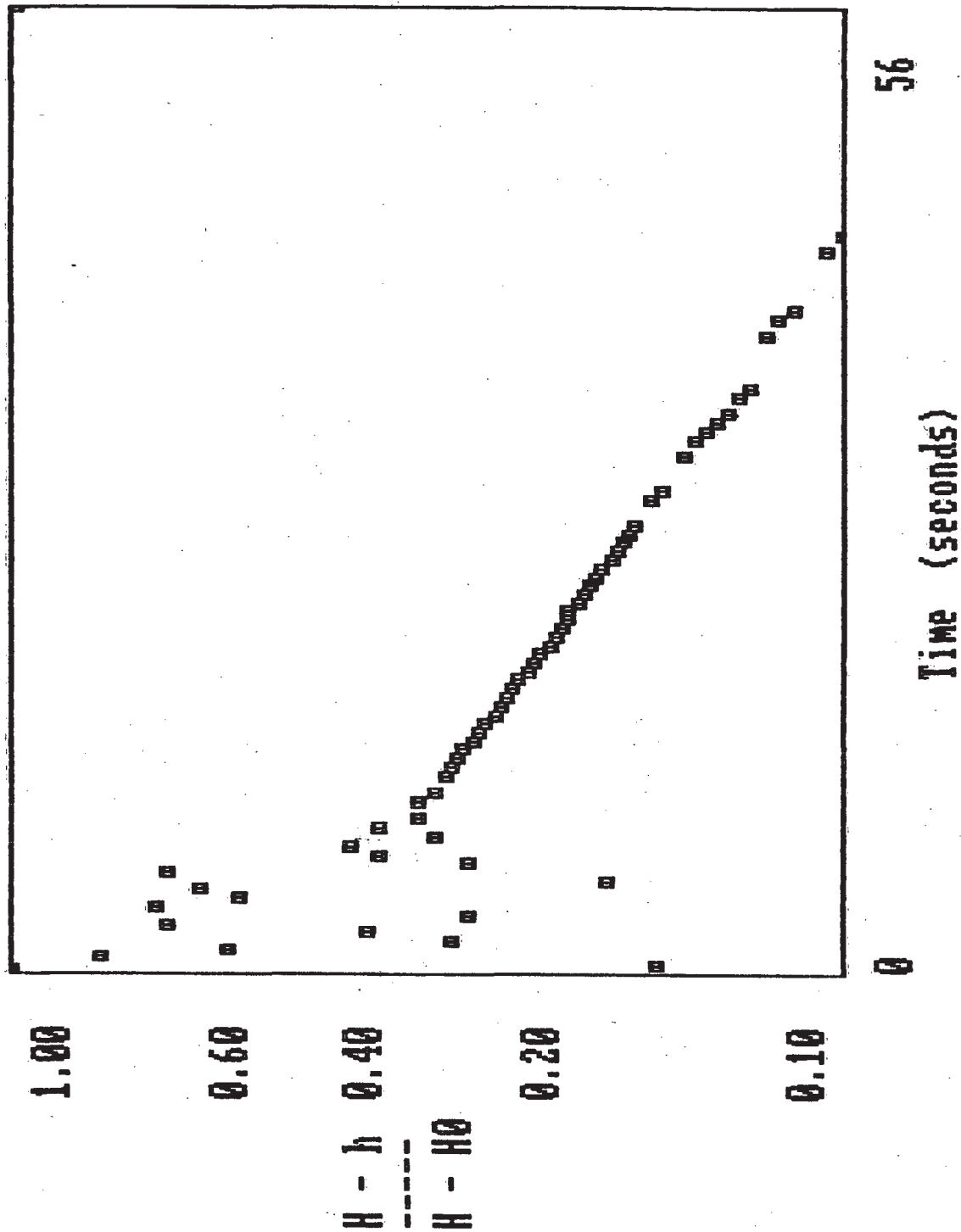
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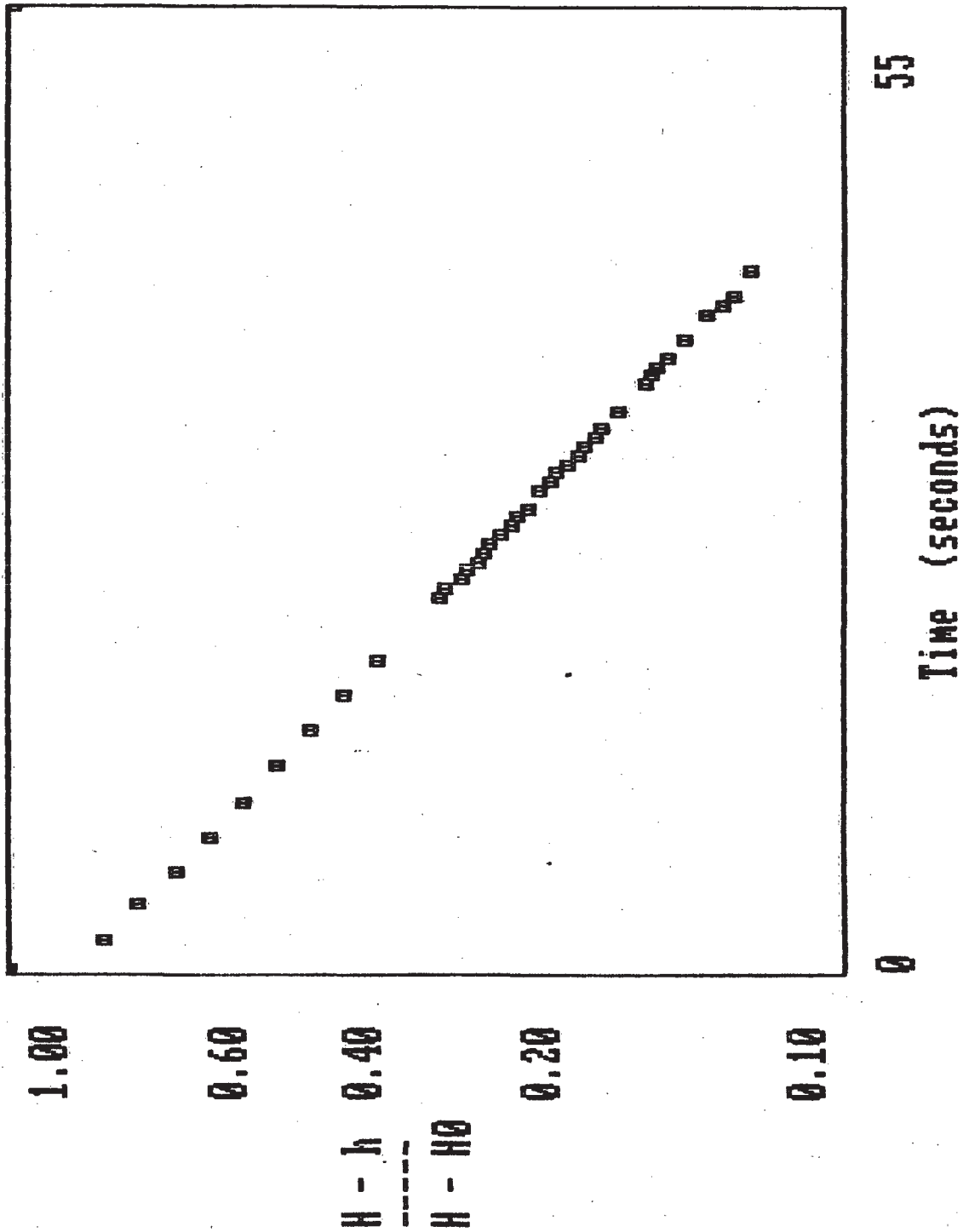
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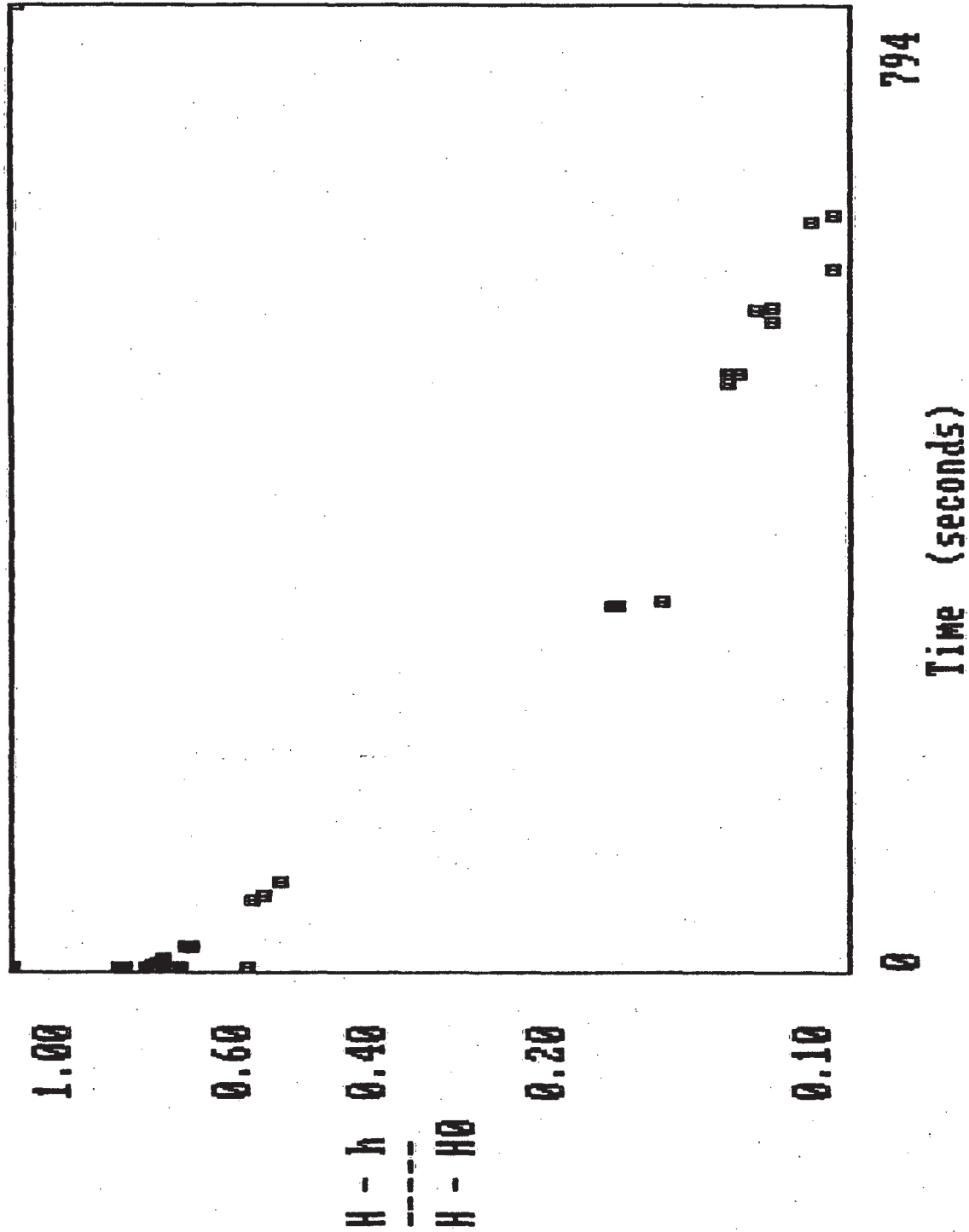
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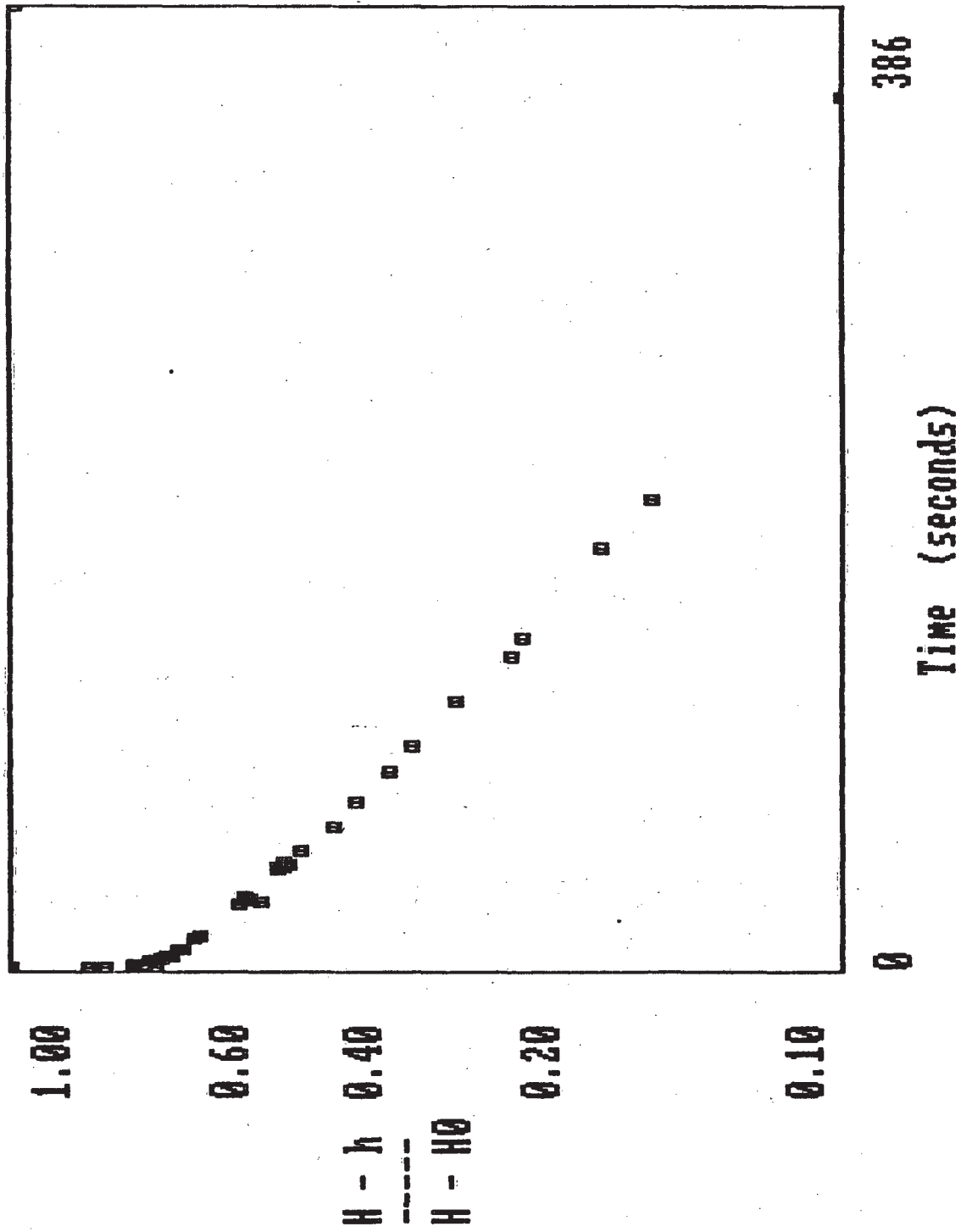
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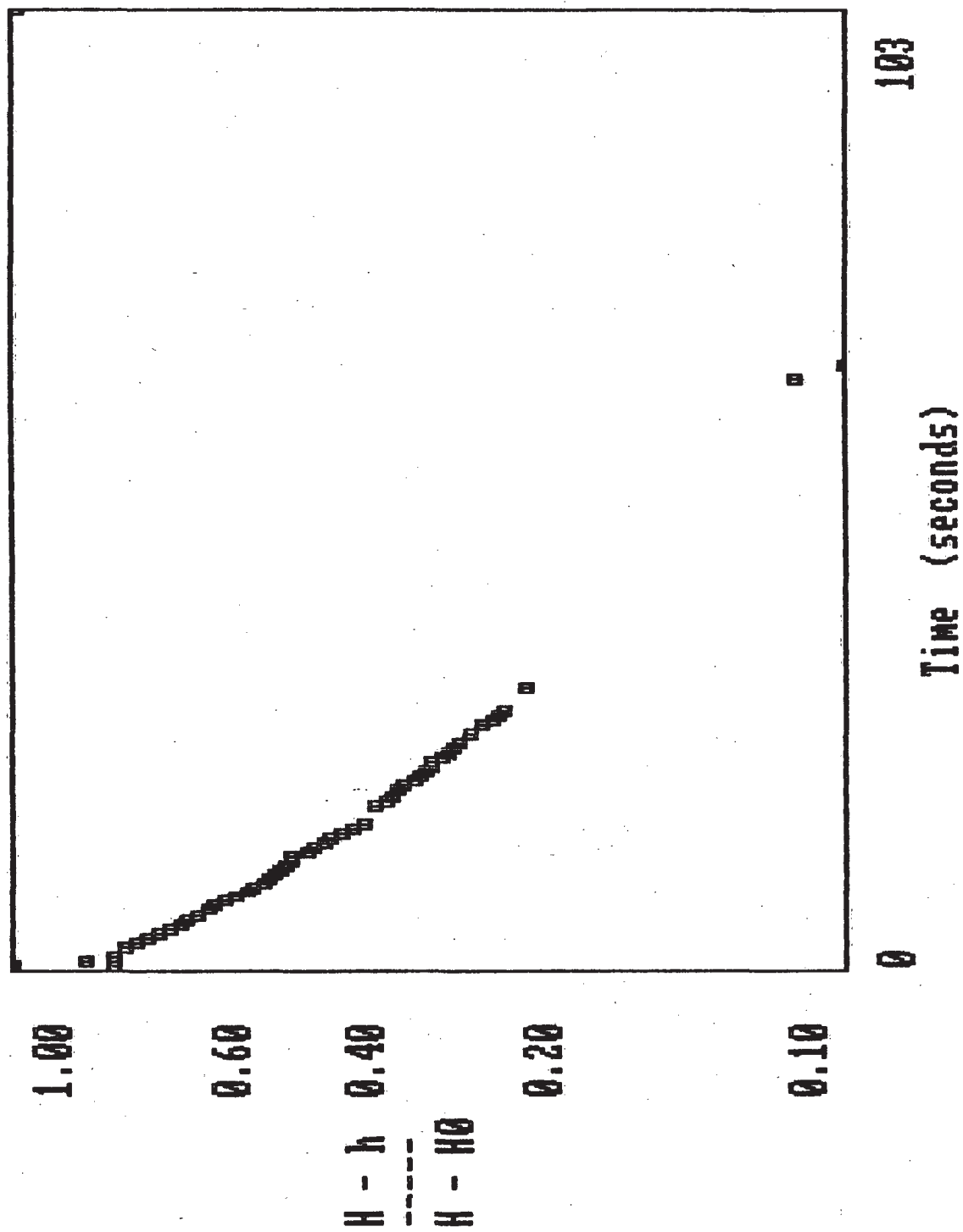
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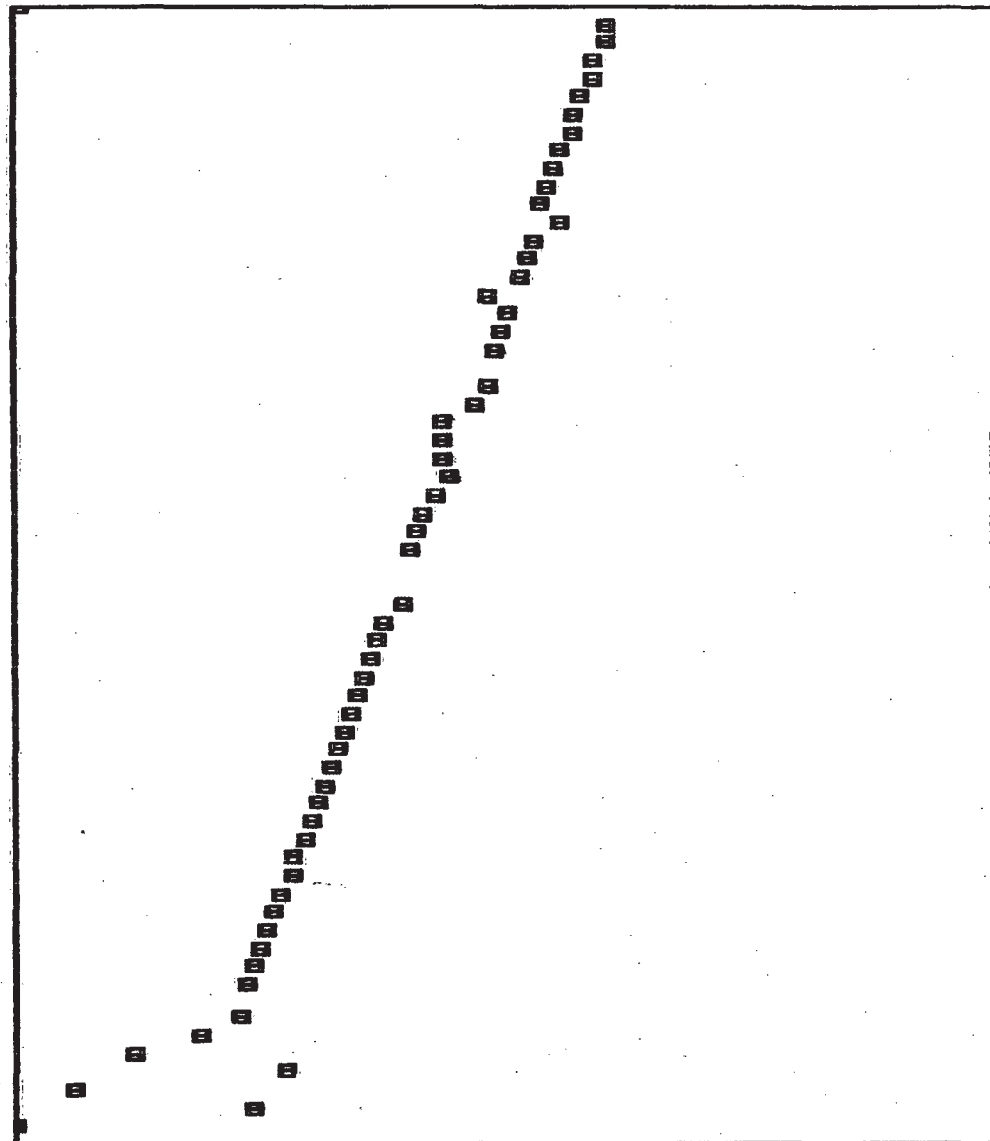
Slug Test: GW-35 TEST 1



Slug Test: GW-36 TEST 1



Bail Test: GW-37 Test 2



32

Time (seconds)

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1.00

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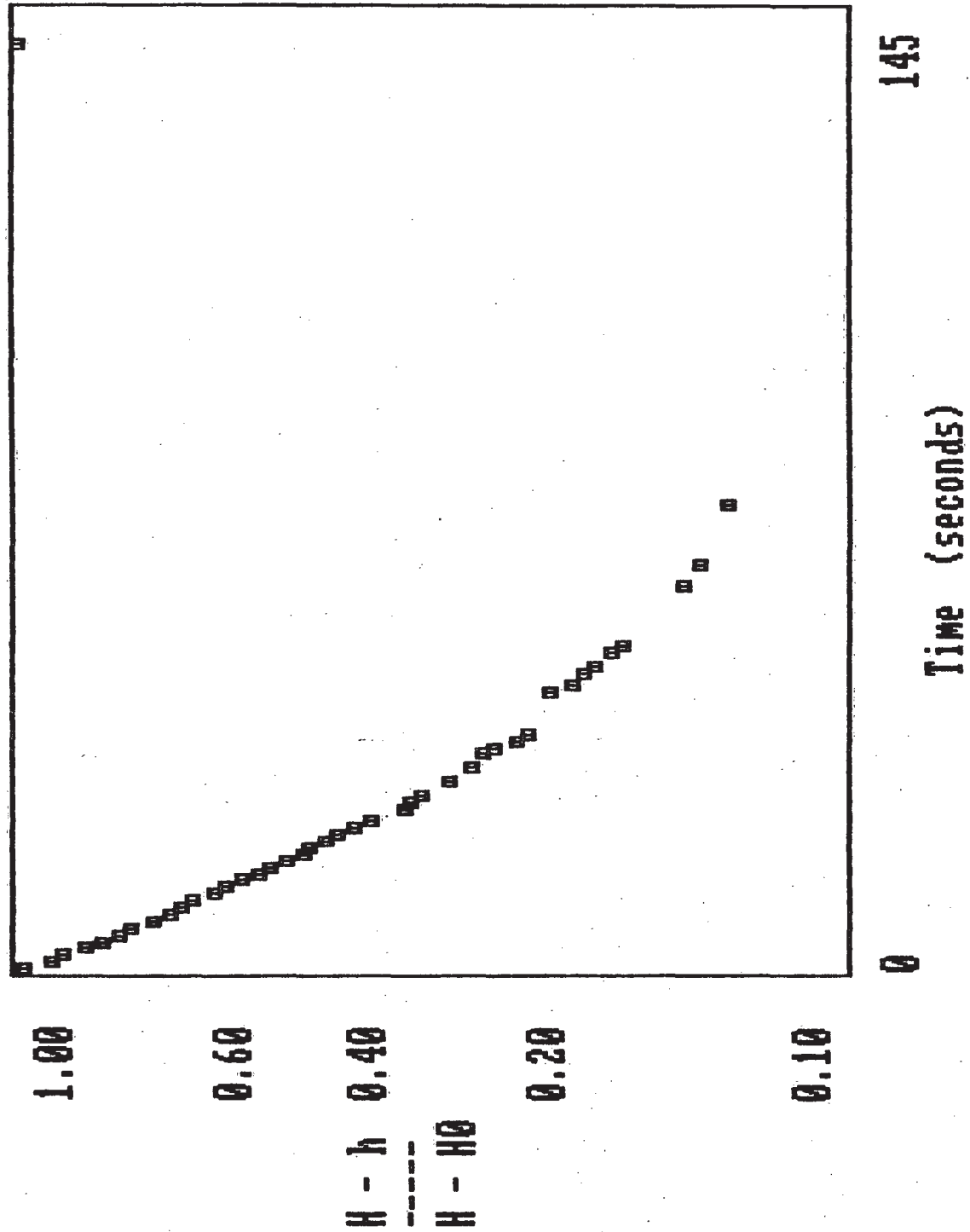
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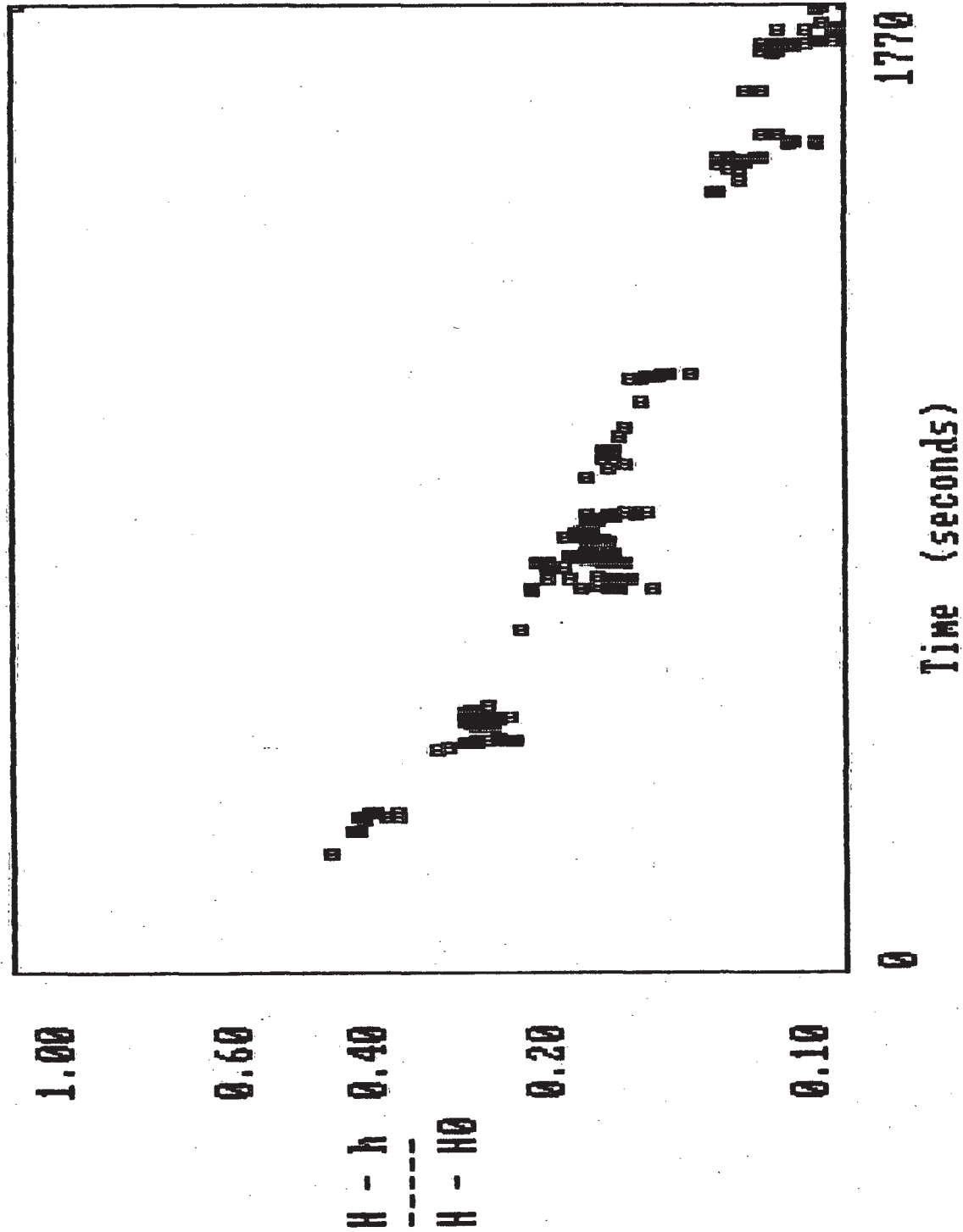
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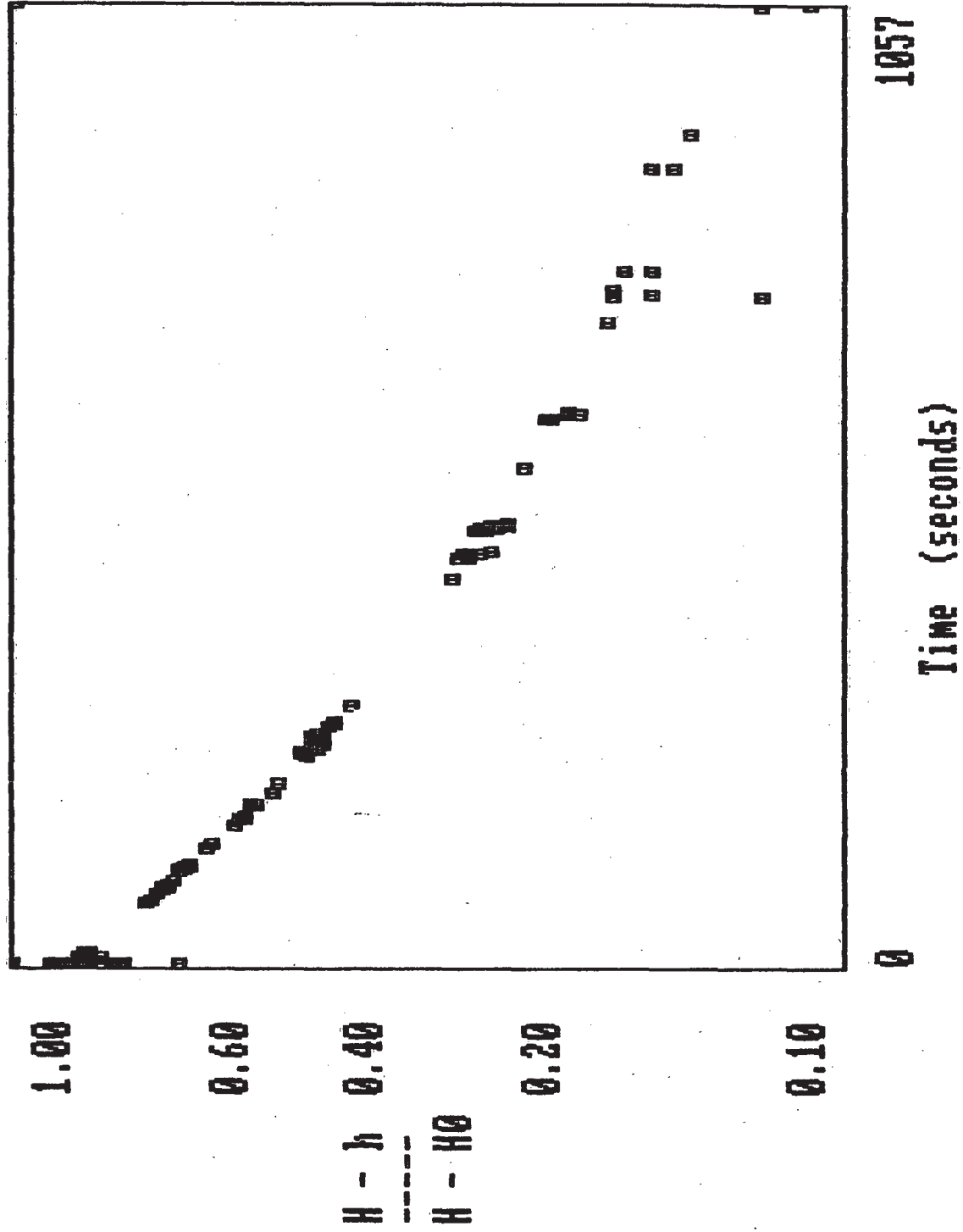
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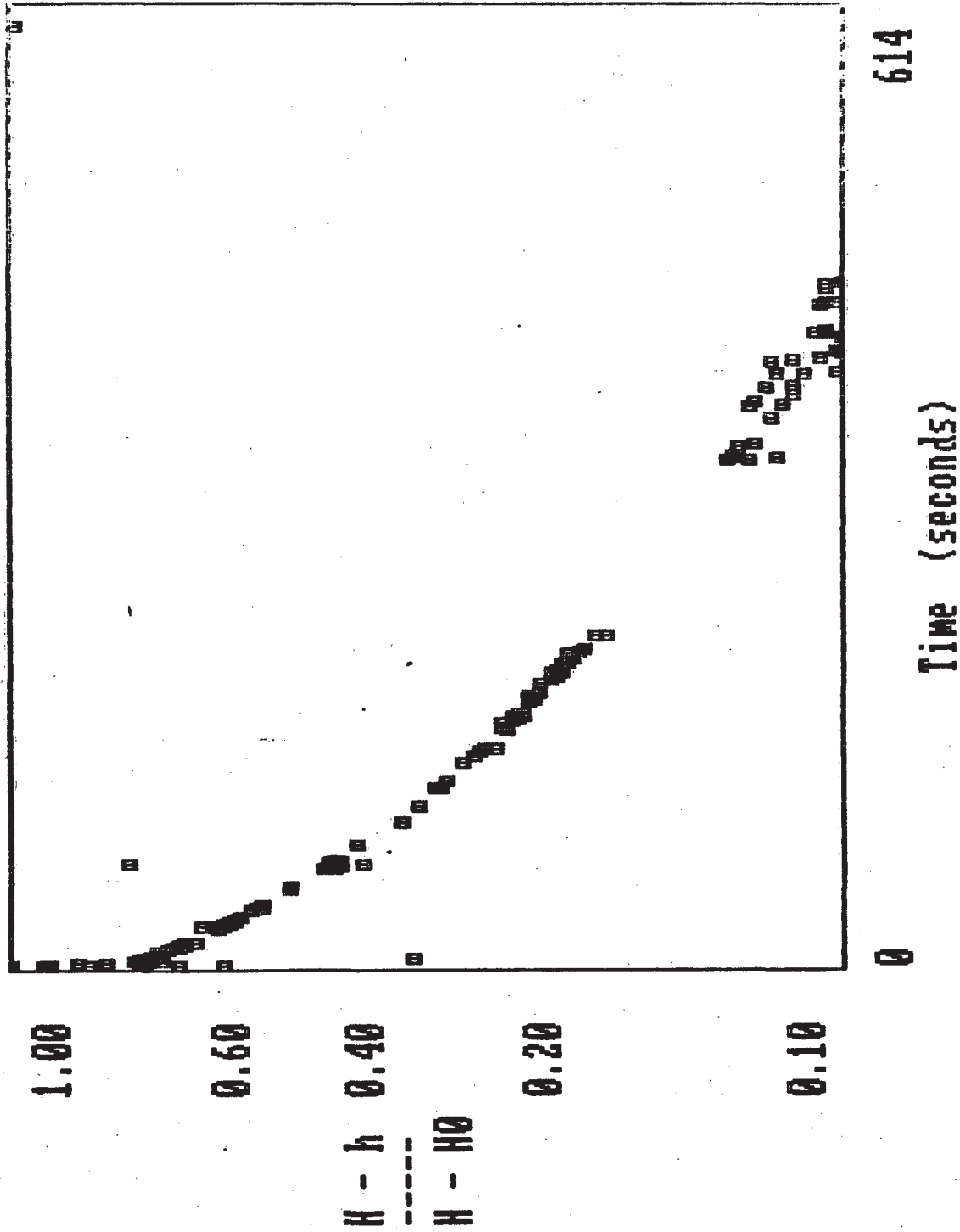
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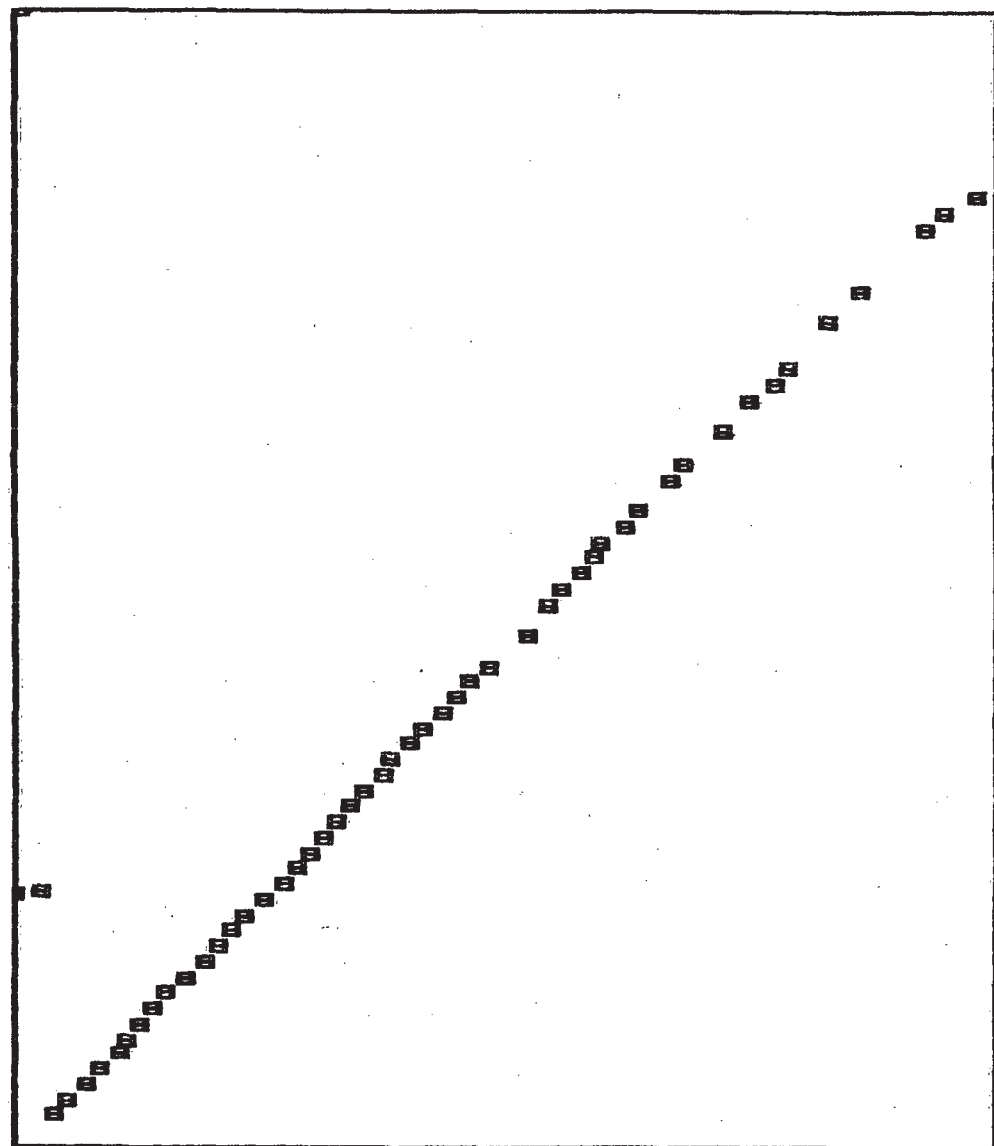
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Slug Test: GW-41 Test 1

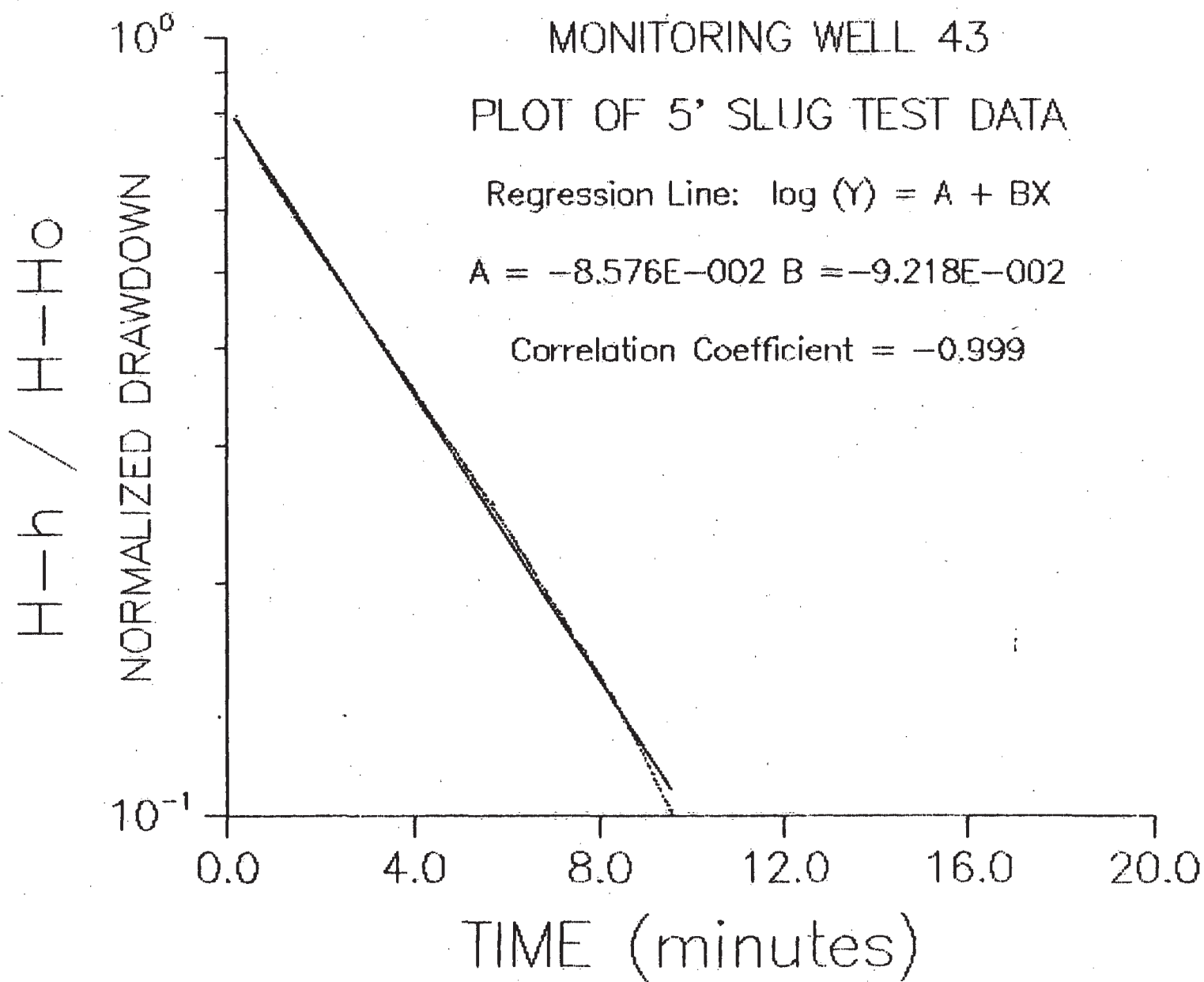


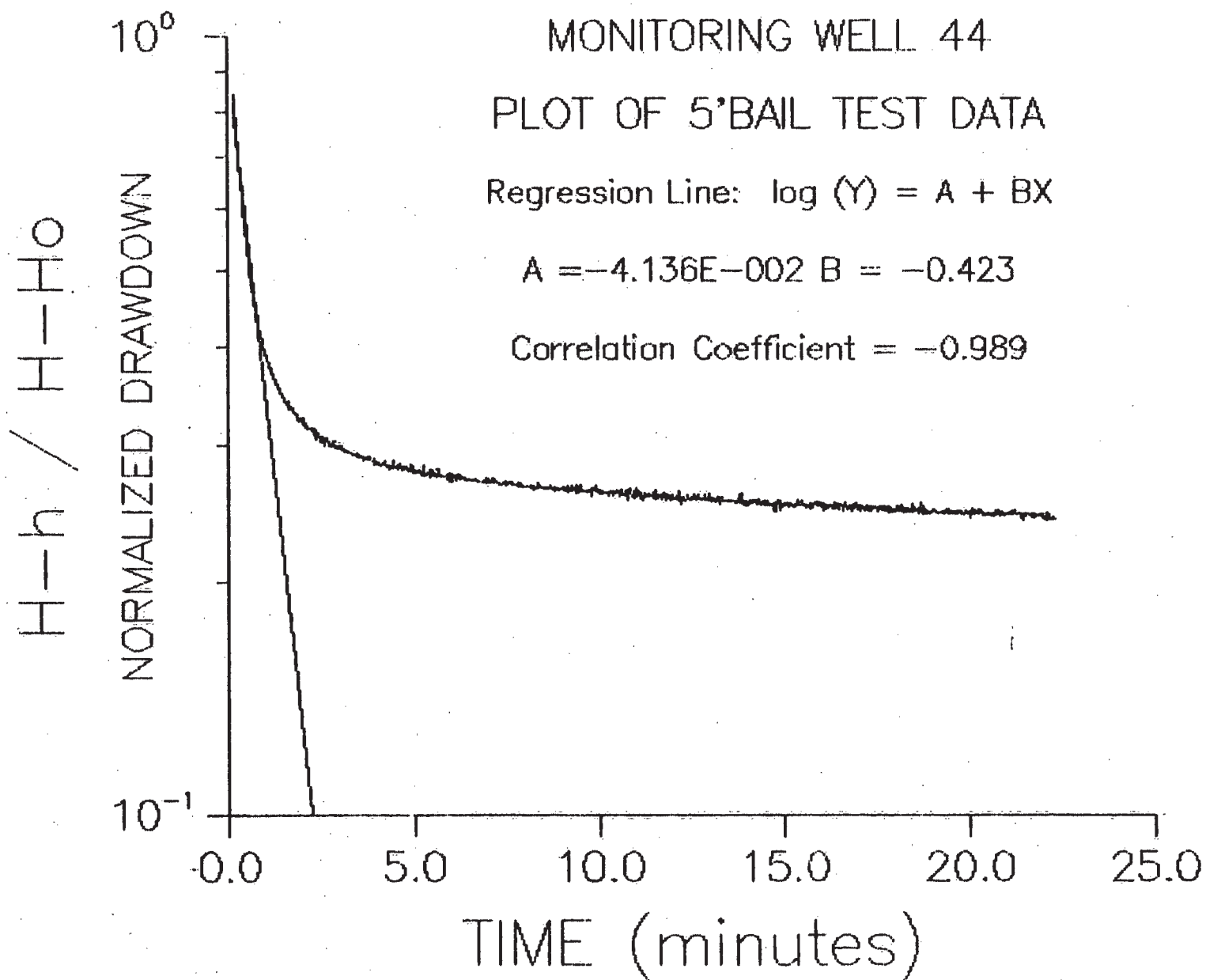
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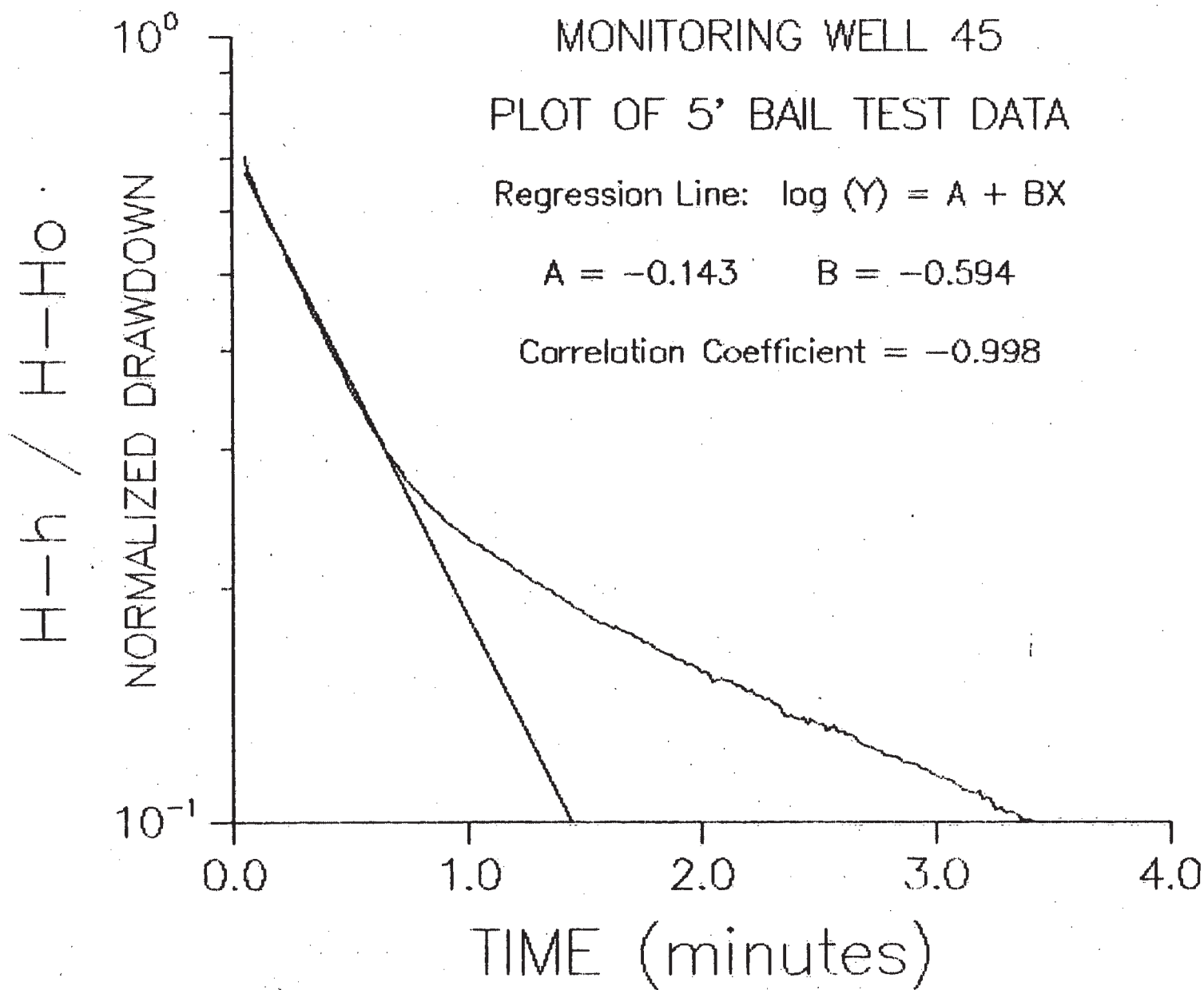


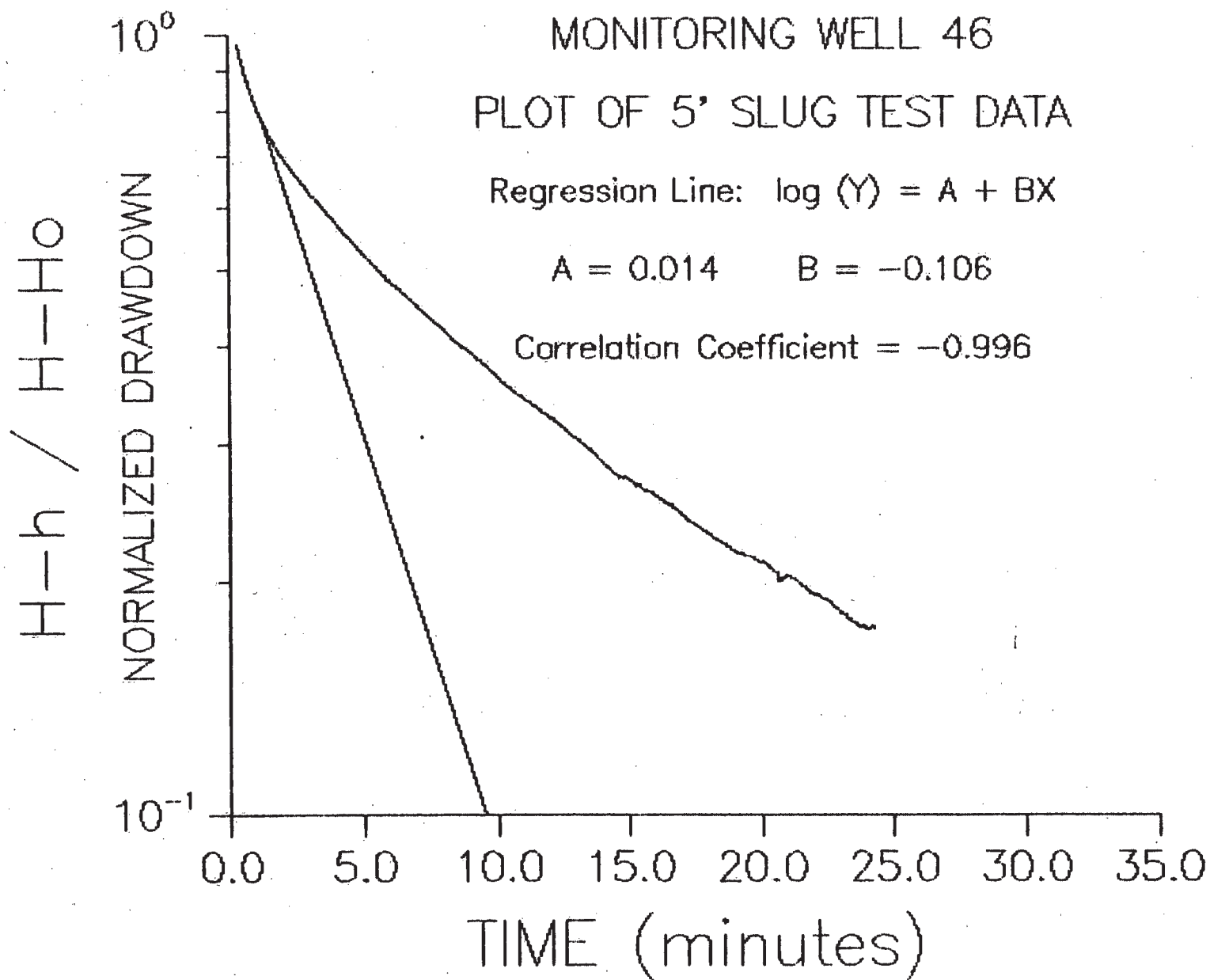
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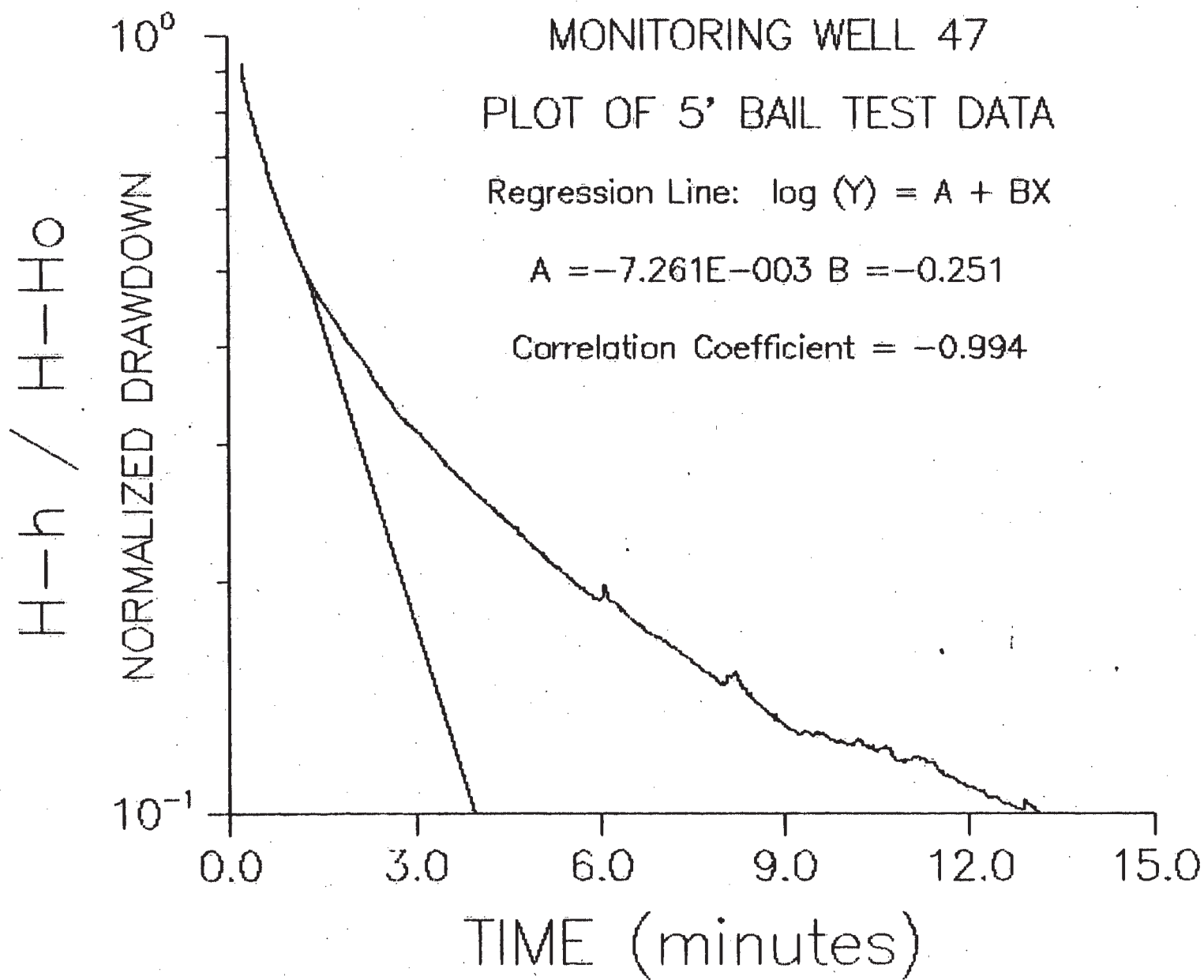
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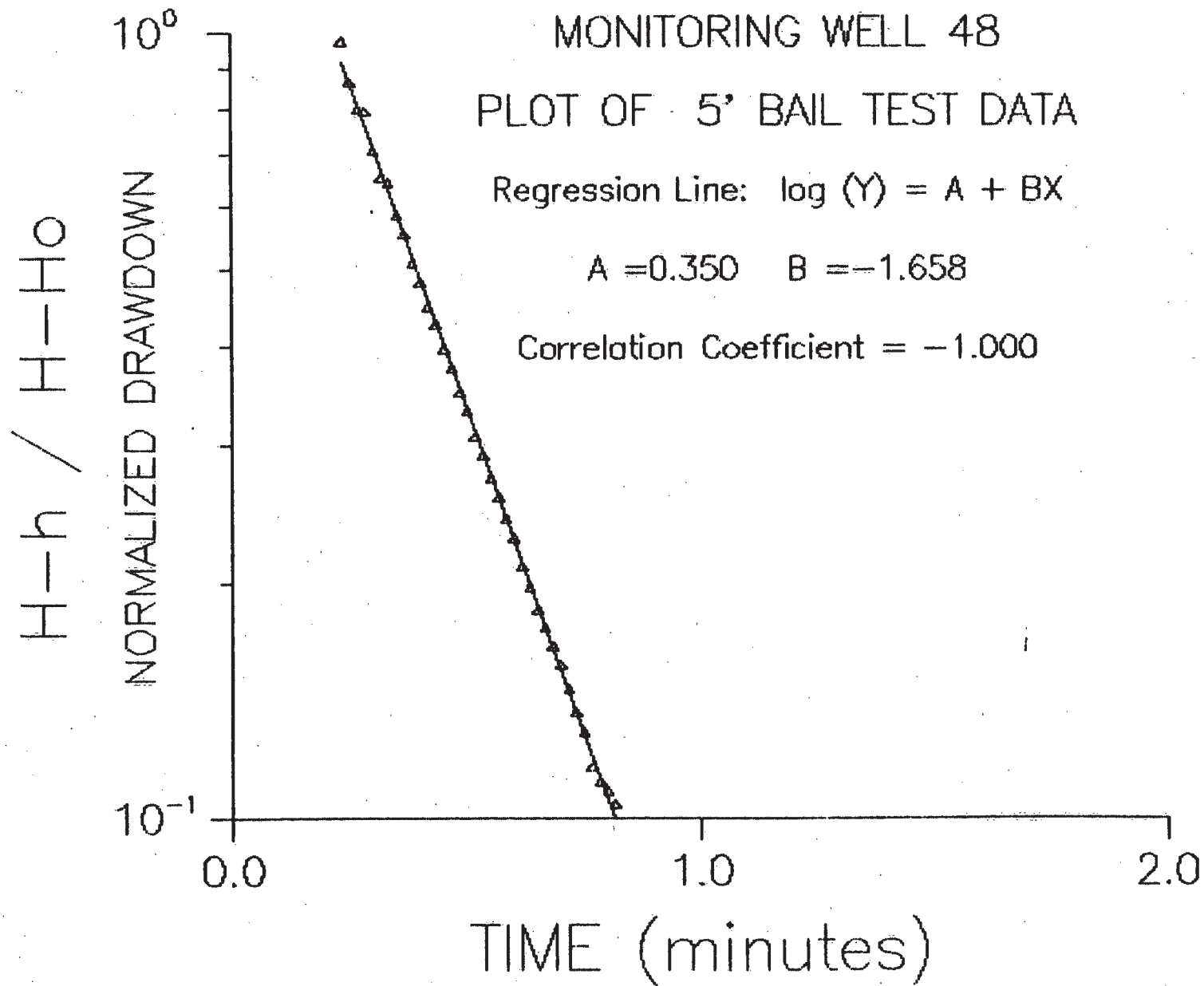


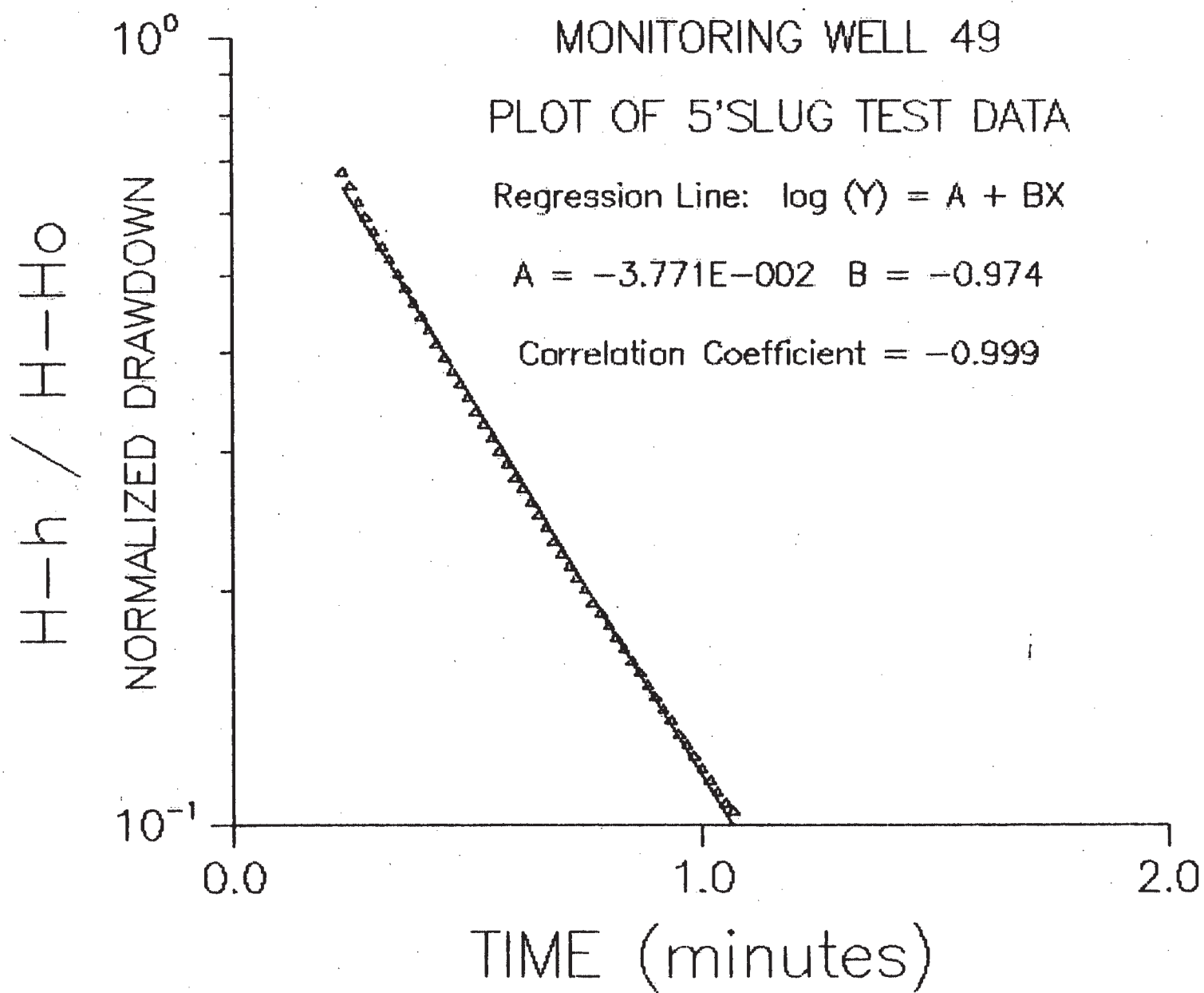


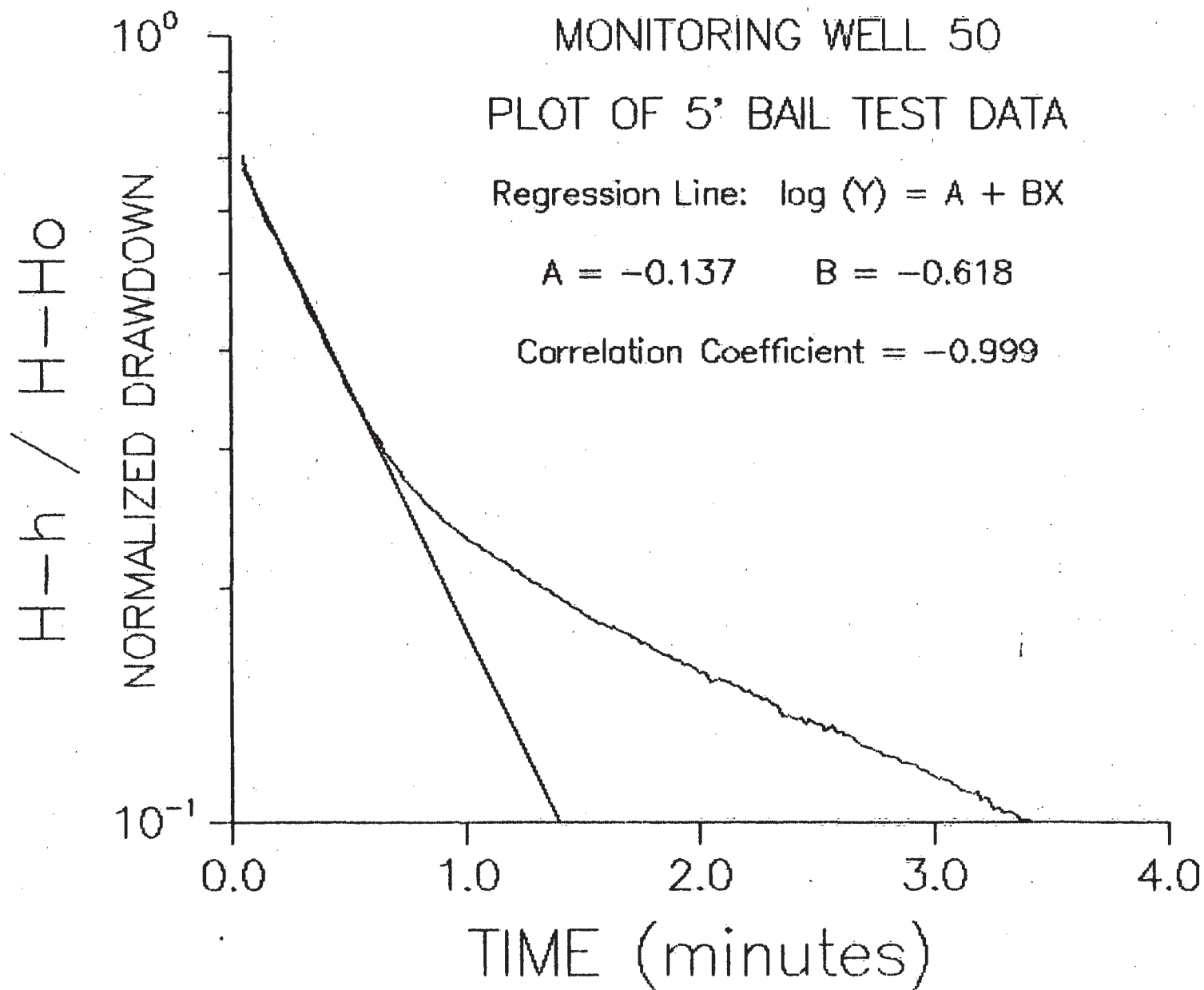












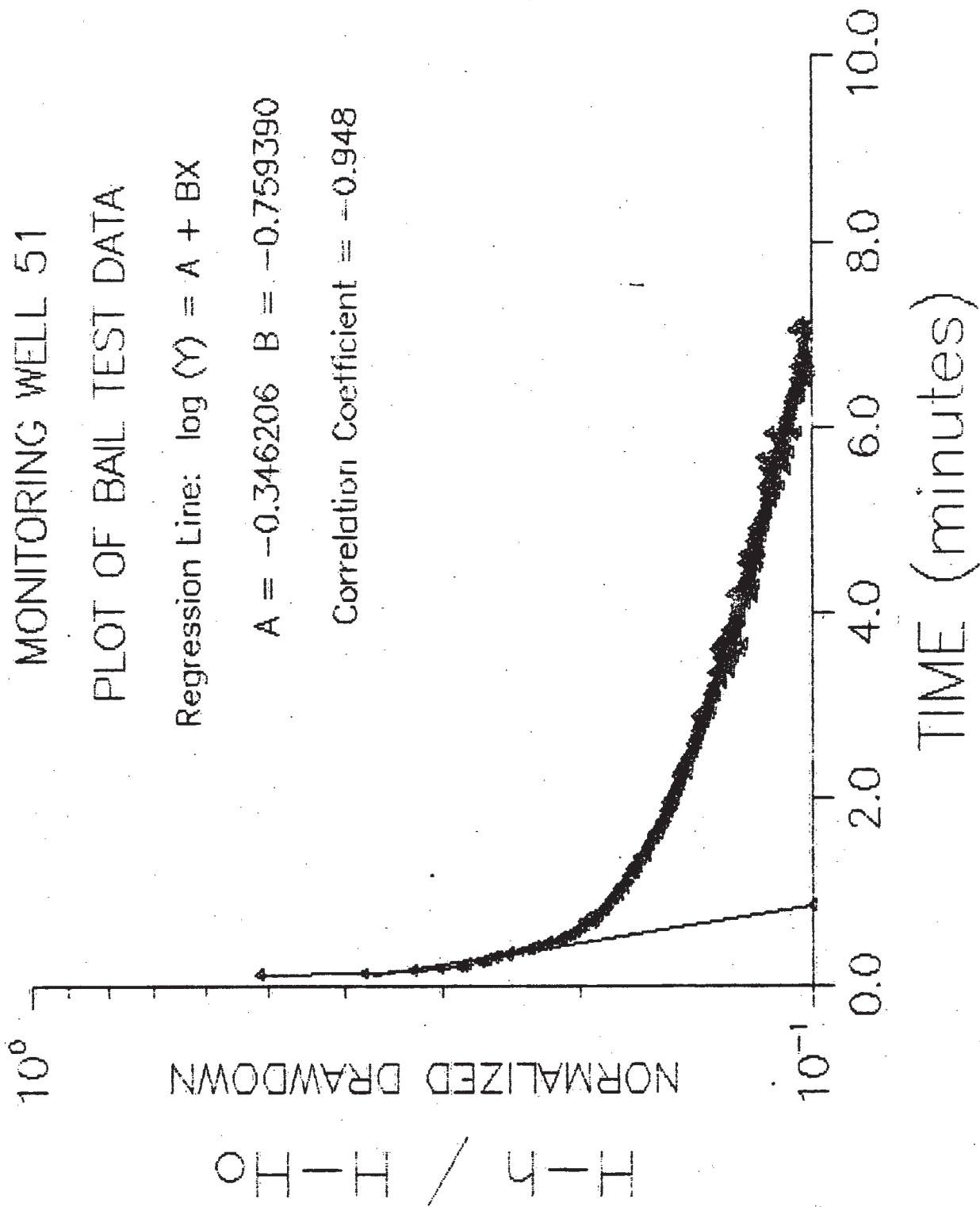
MONITORING WELL 51

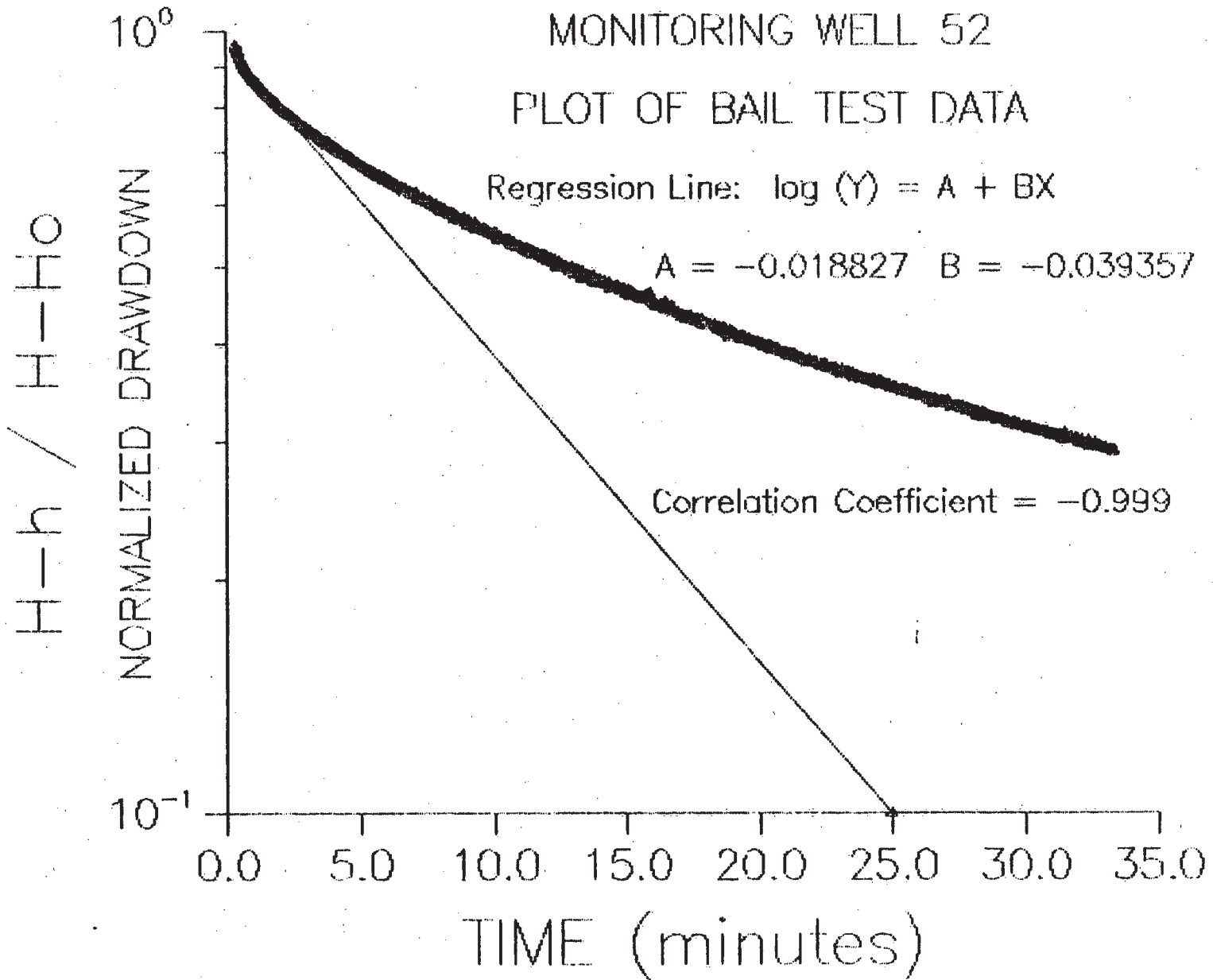
PLOT OF BAIL TEST DATA

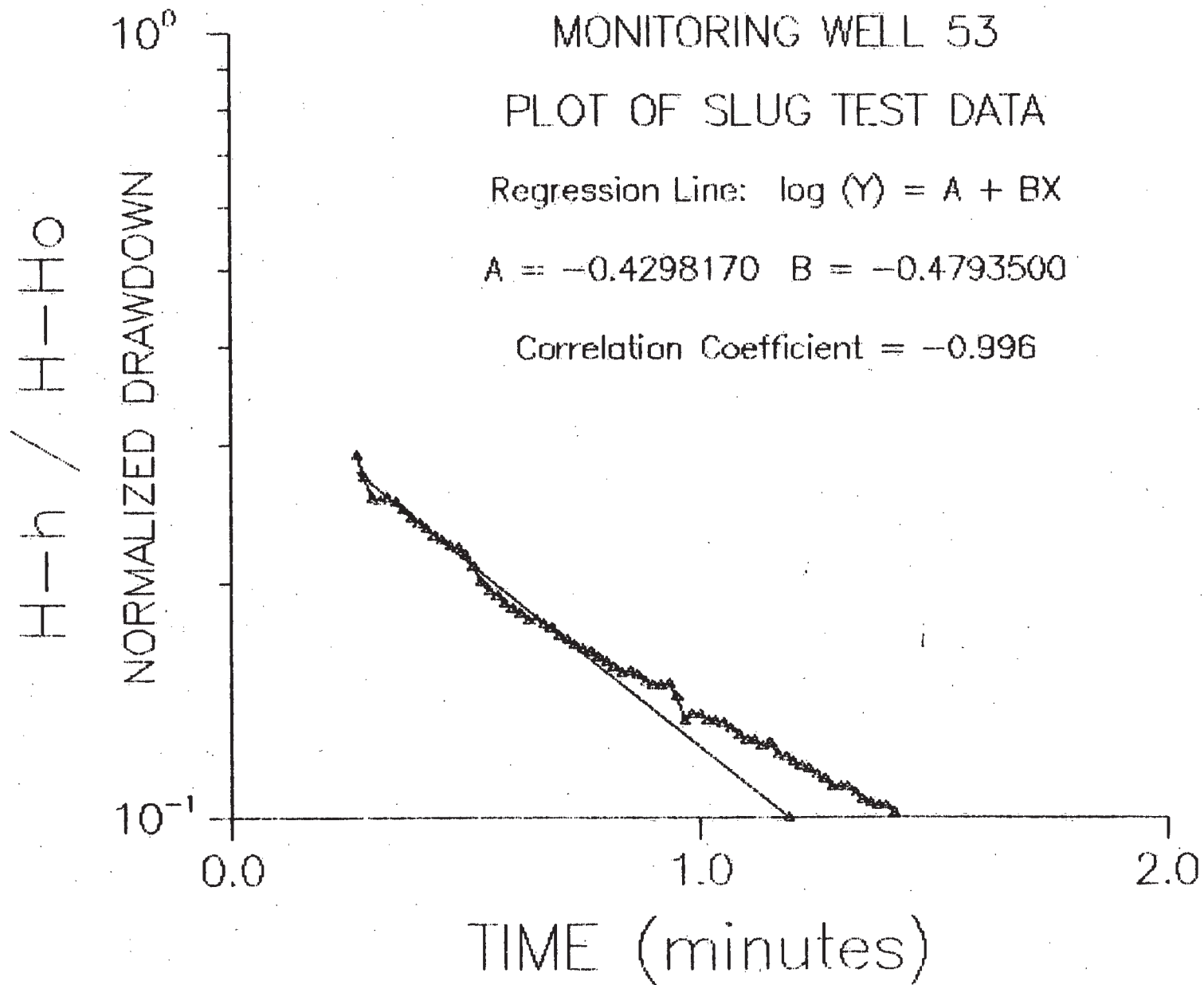
Regression Line: $\log(Y) = A + BX$

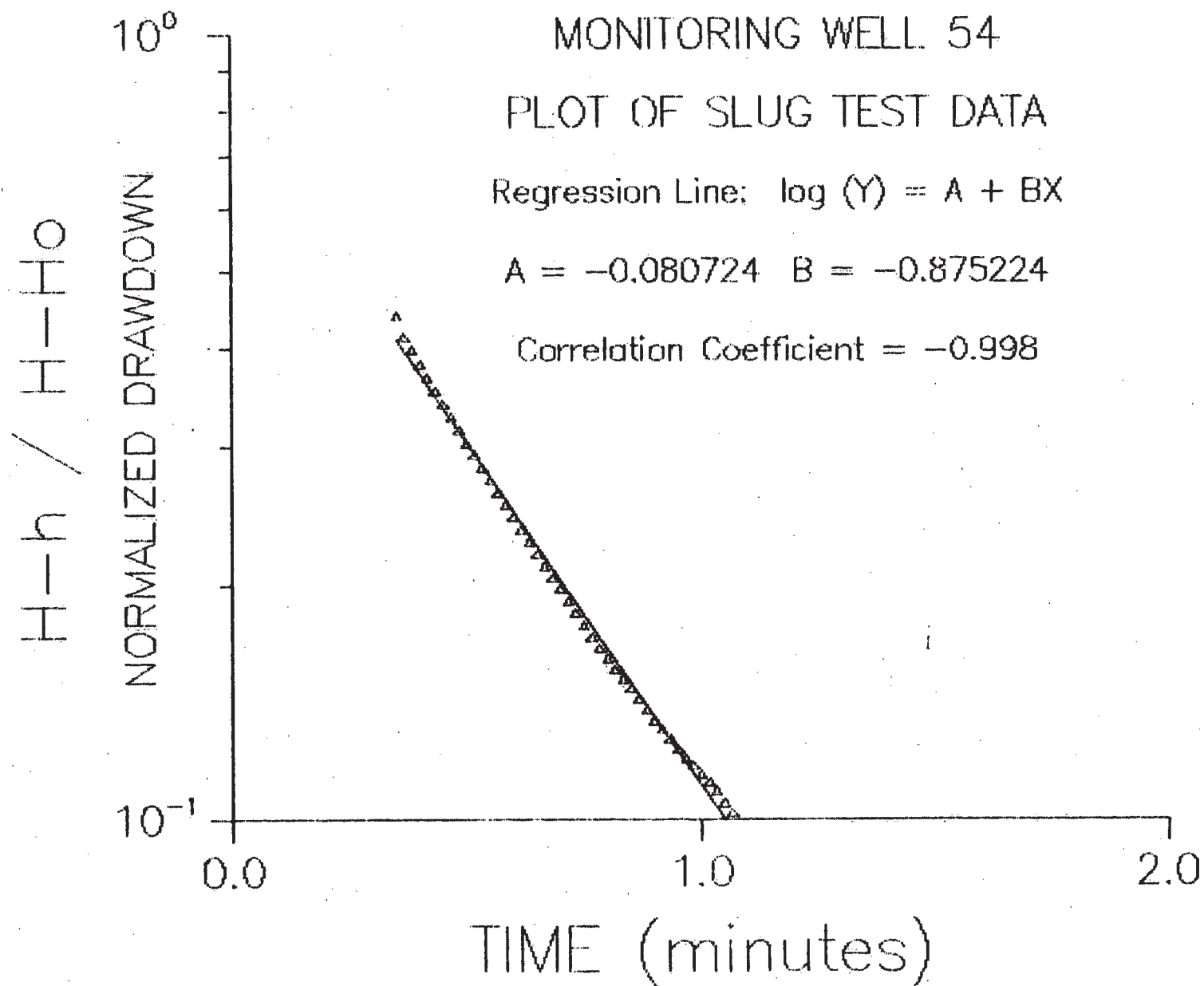
$A = -0.346206$ $B = -0.759390$

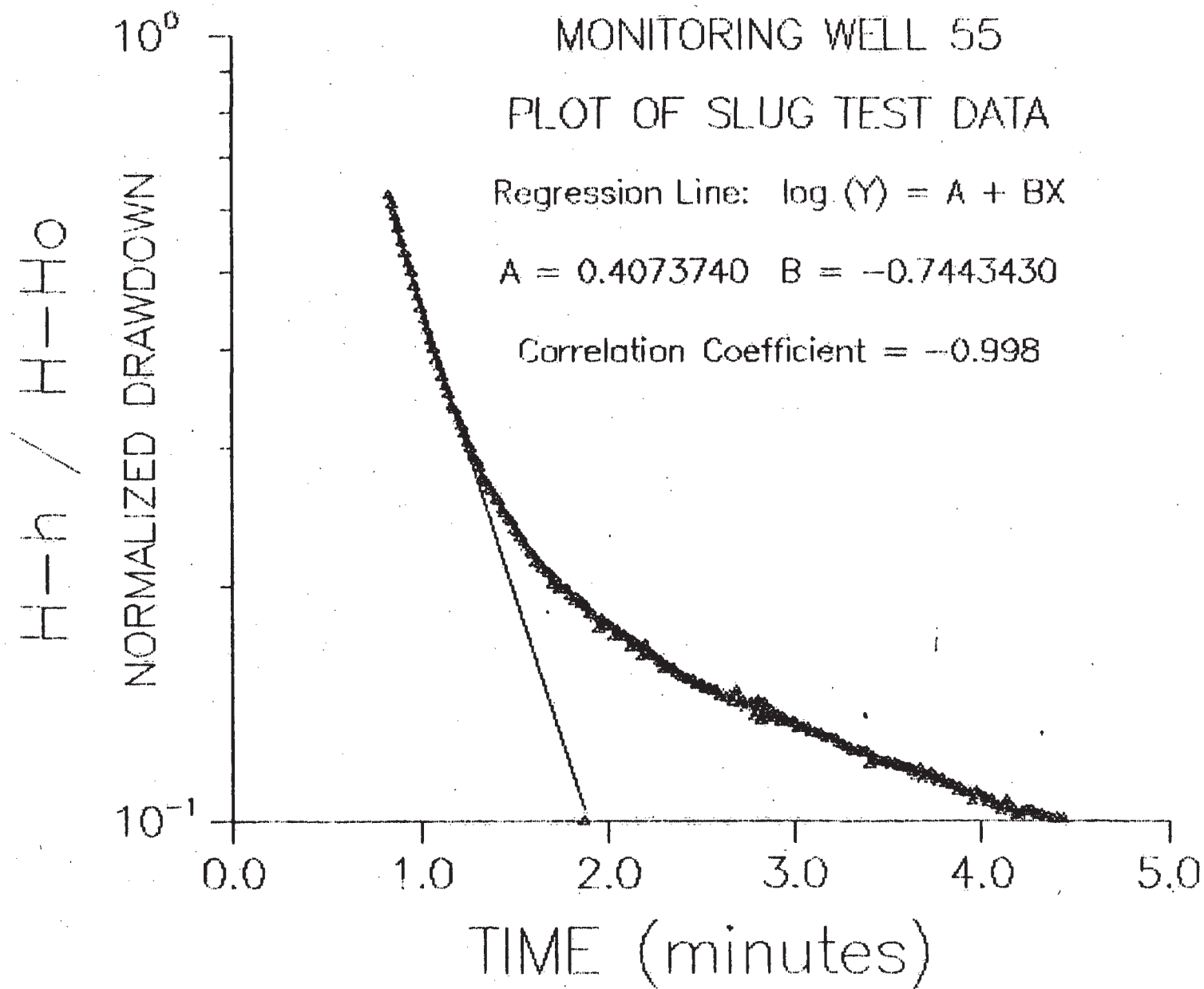
Correlation Coefficient = -0.948

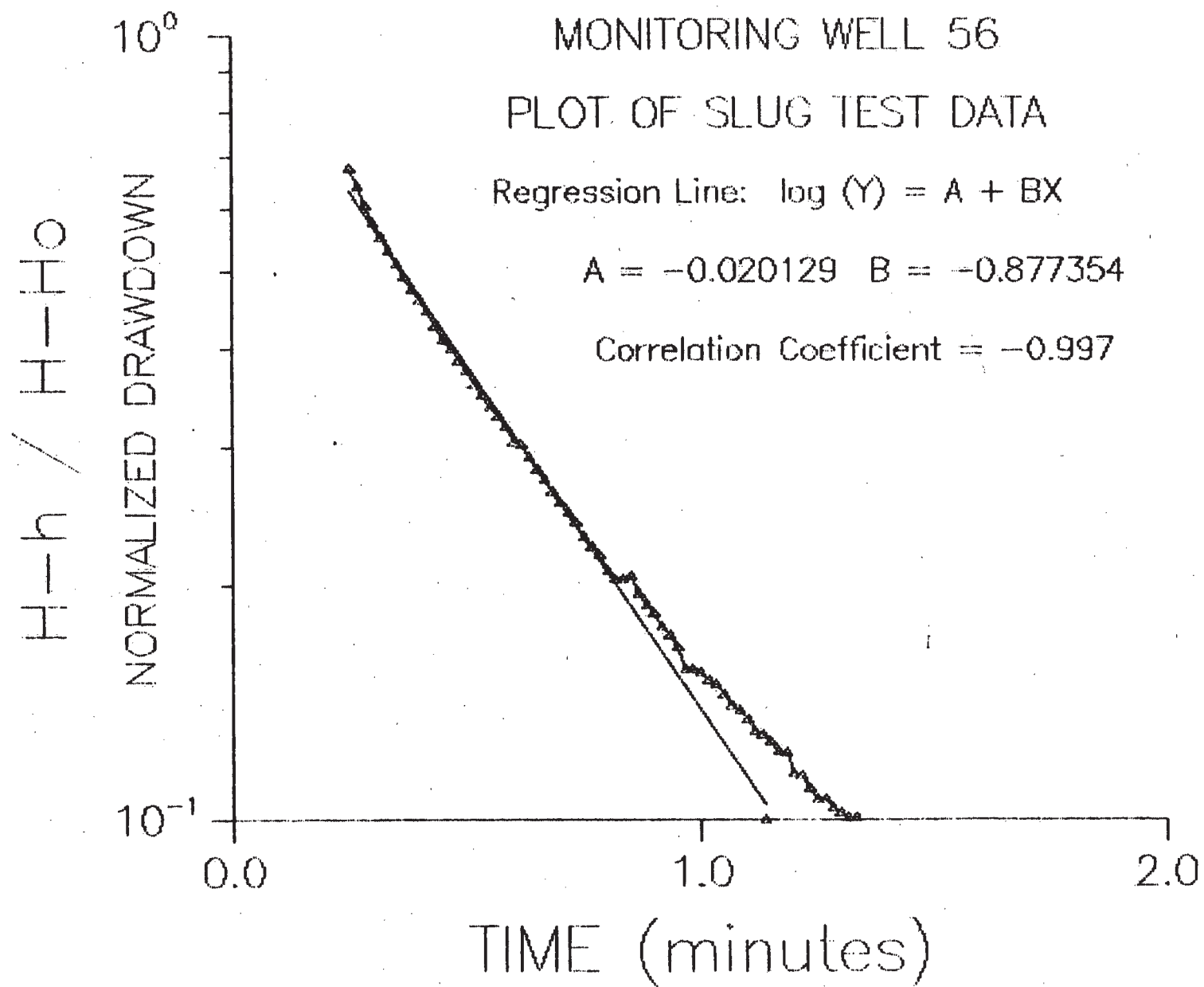


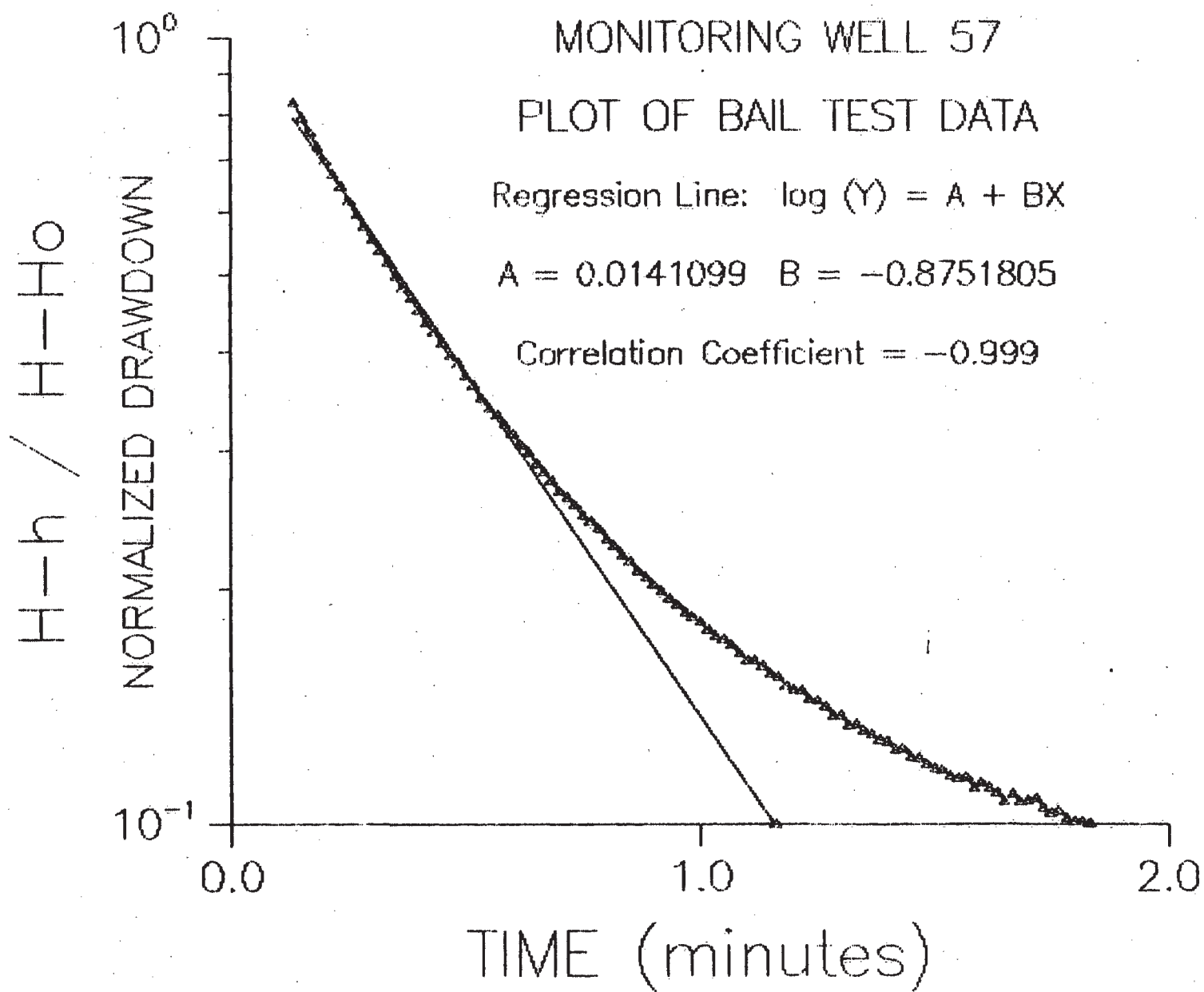


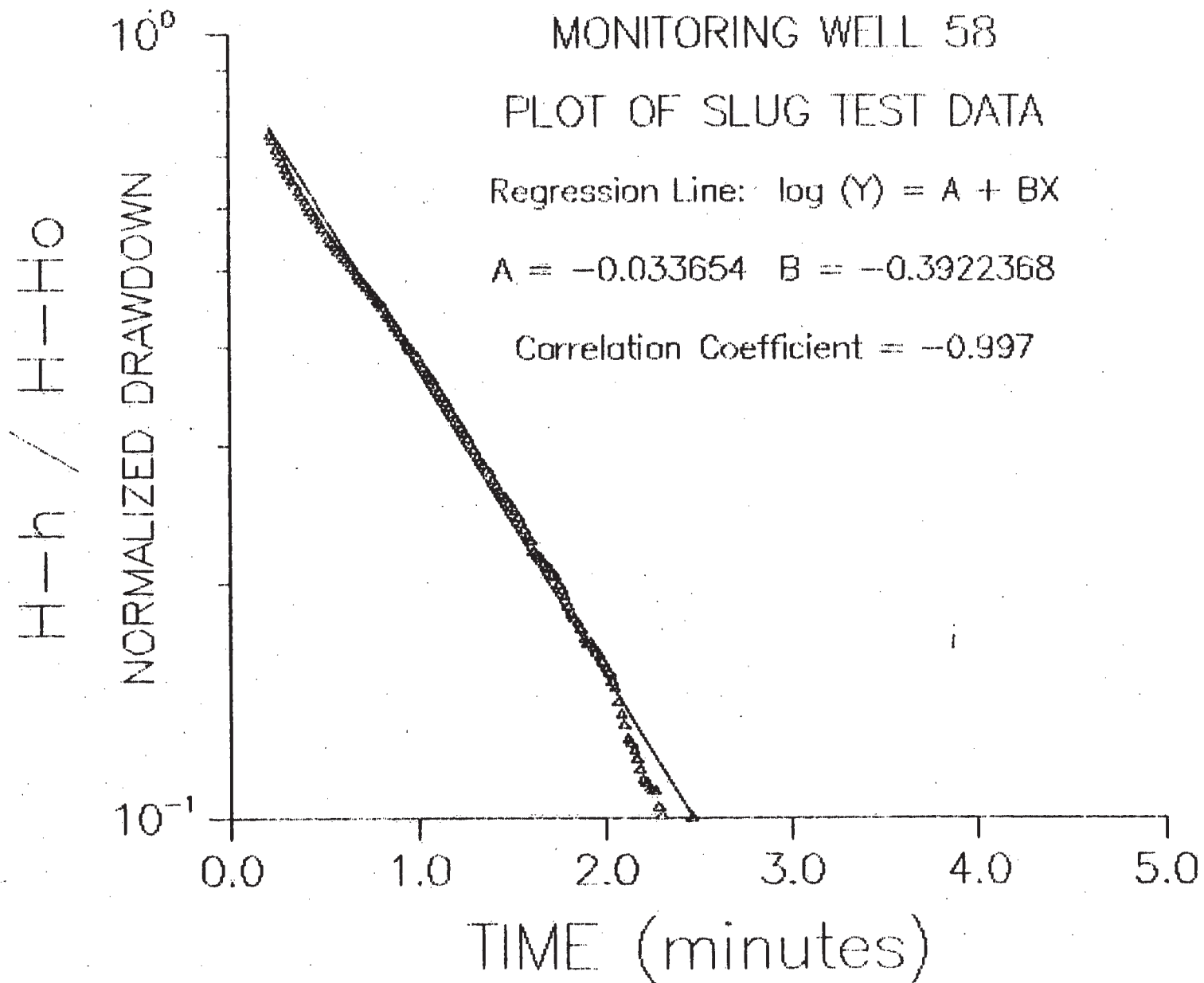












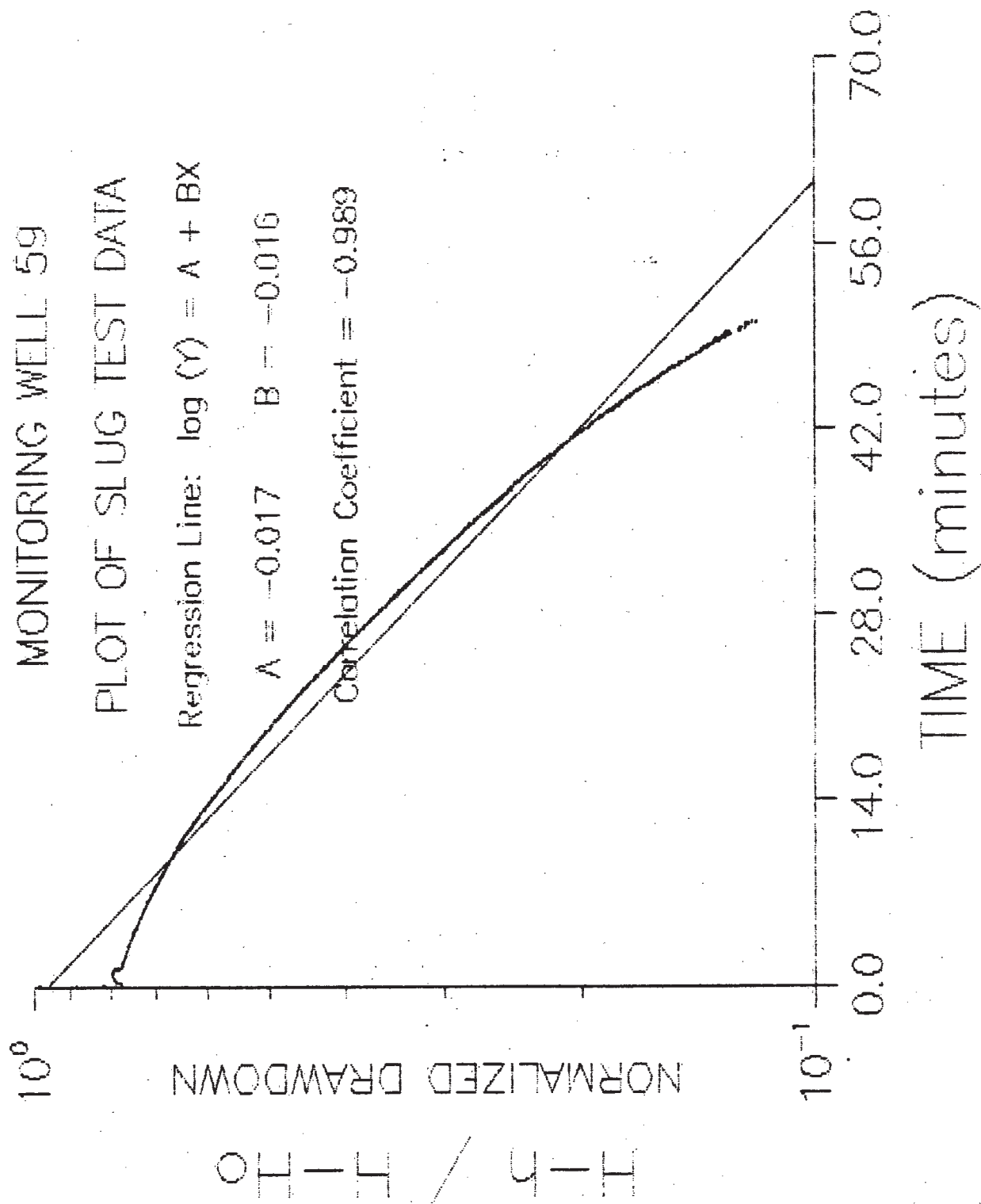
MONITORING WELL 59

PLOT OF SLUG TEST DATA

Regression Line: $\log(Y) = A + BX$

$A = -0.017$ $B = -0.016$

Correlation Coefficient = -0.989



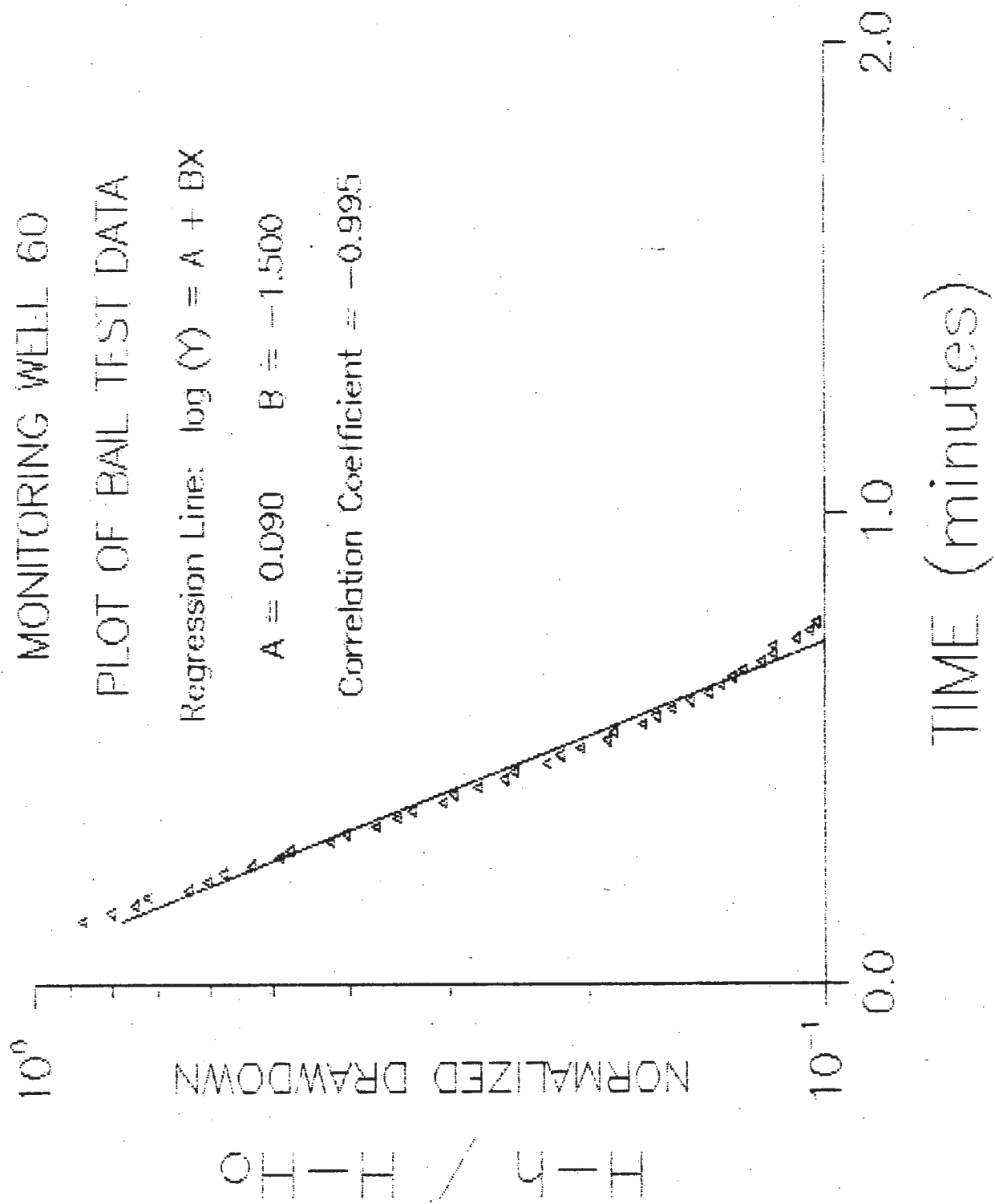
MONITORING WELL 60

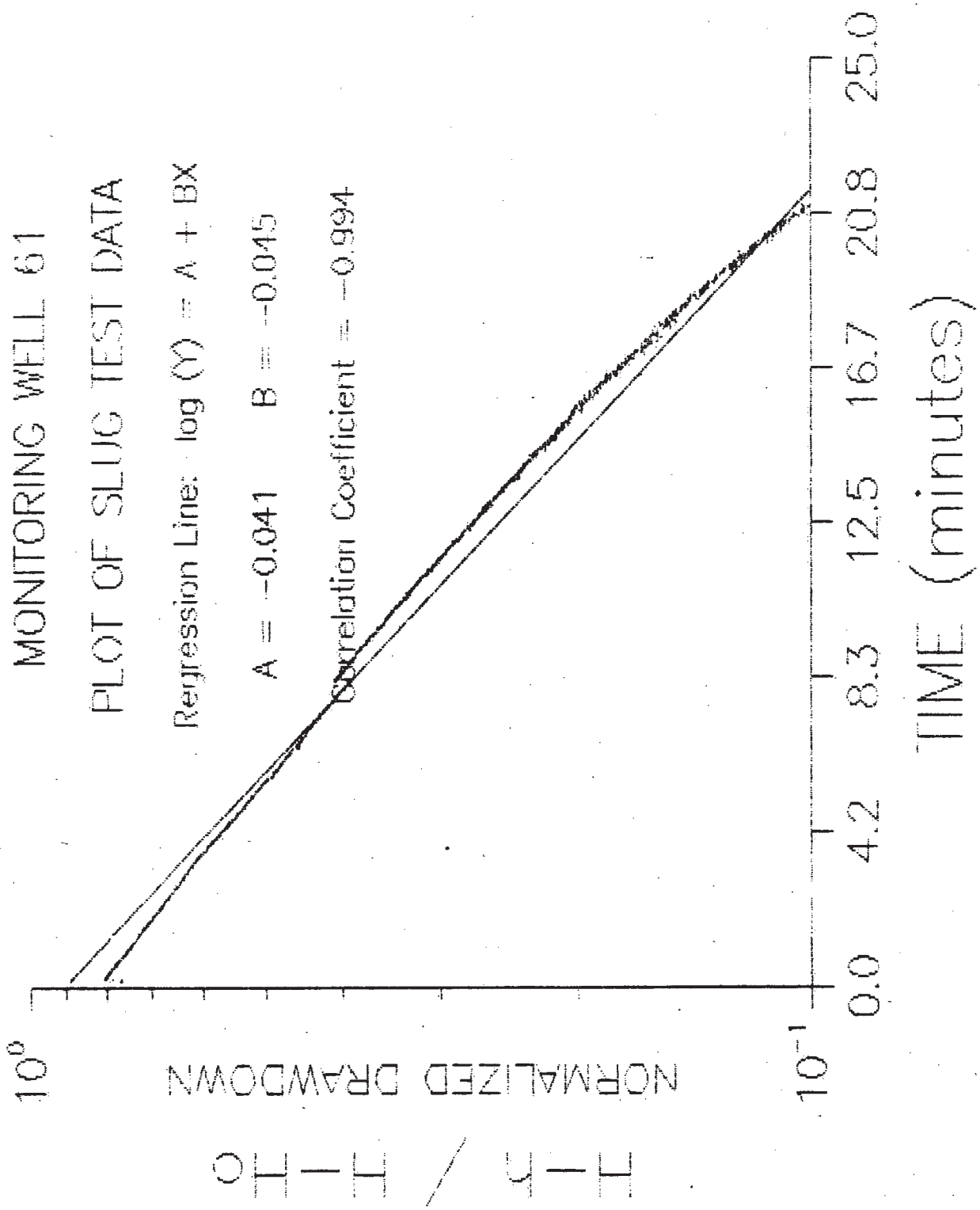
PLOT OF BAIL TEST DATA

Regression Line: $\log(Y) = A + BX$

$A = 0.090$ $B = -1.500$

Correlation Coefficient = -0.995





Hercules Aerospace Company
Bacchus Works

Groundwater Quality Assessment
November 15, 1988

APPENDIX G

LONG-TERM PUMPING TEST RESULTS

GW-7/OW-1 Long-Term Pumping Test

Transmissivity Calculation:

$$T = [c_1 (Qs_d/s)]/7.48$$

where

T = transmissivity (ft²/day)
c₁ = 114.6 (constant)
Q = 20 (gallons per minute)
s_d = 1 dimensionless (match point)
s = 0.1 ft (match point)

$$T = 114.6 (20 \times 1 / 0.1) \text{ ft}^2/\text{day}$$

$$T = 3,060 \text{ ft}^2/\text{day}$$

Hydraulic conductivity (K) calculation:

Assuming a saturated thickness (b) of 10 feet:

$$K = T/b \text{ ft/day}$$

$$K = 306 \text{ ft/day}$$

Specific Yield Calculation:

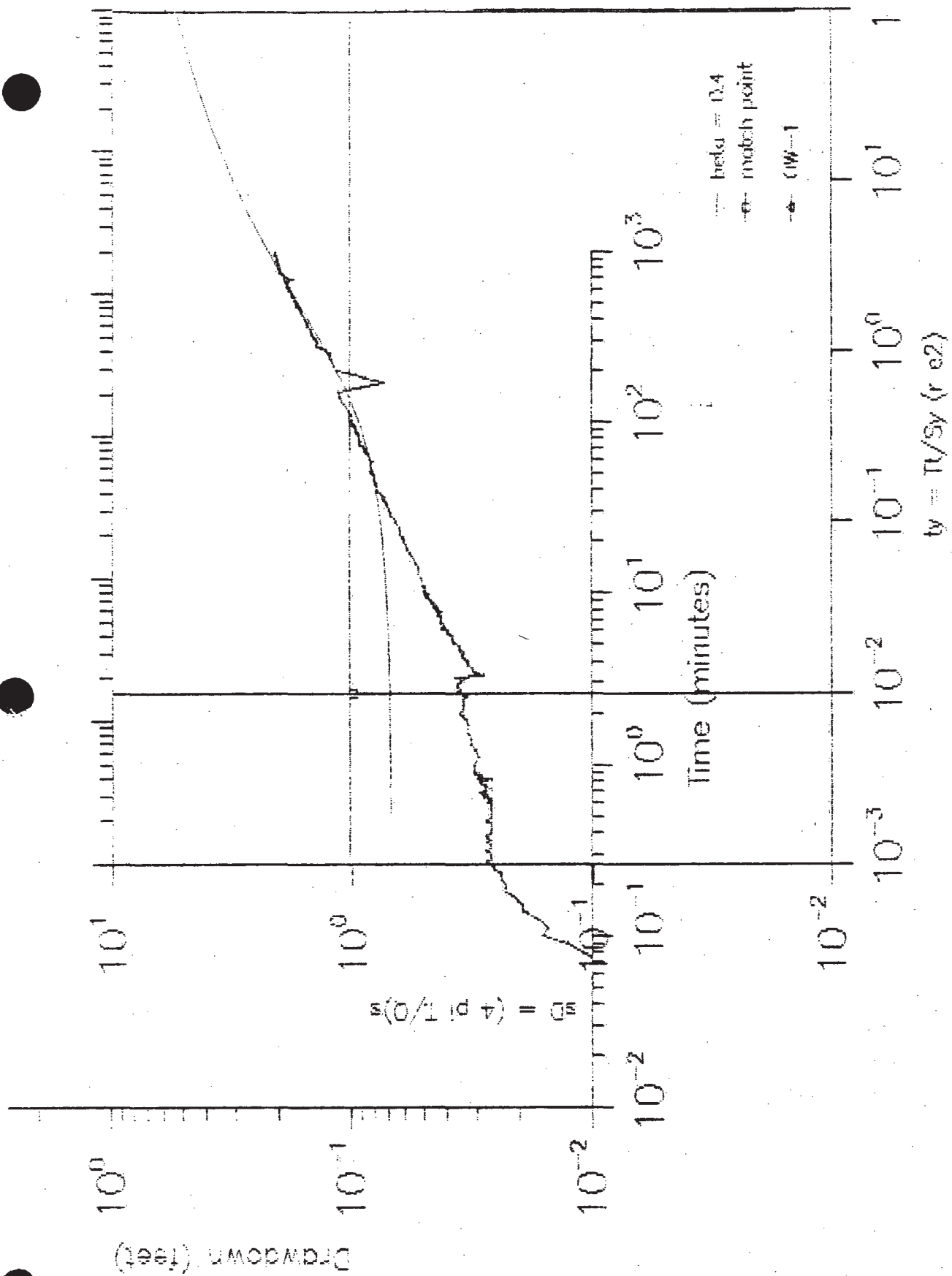
$$S_y = c_2 (Tt/r^2t_y)$$

where

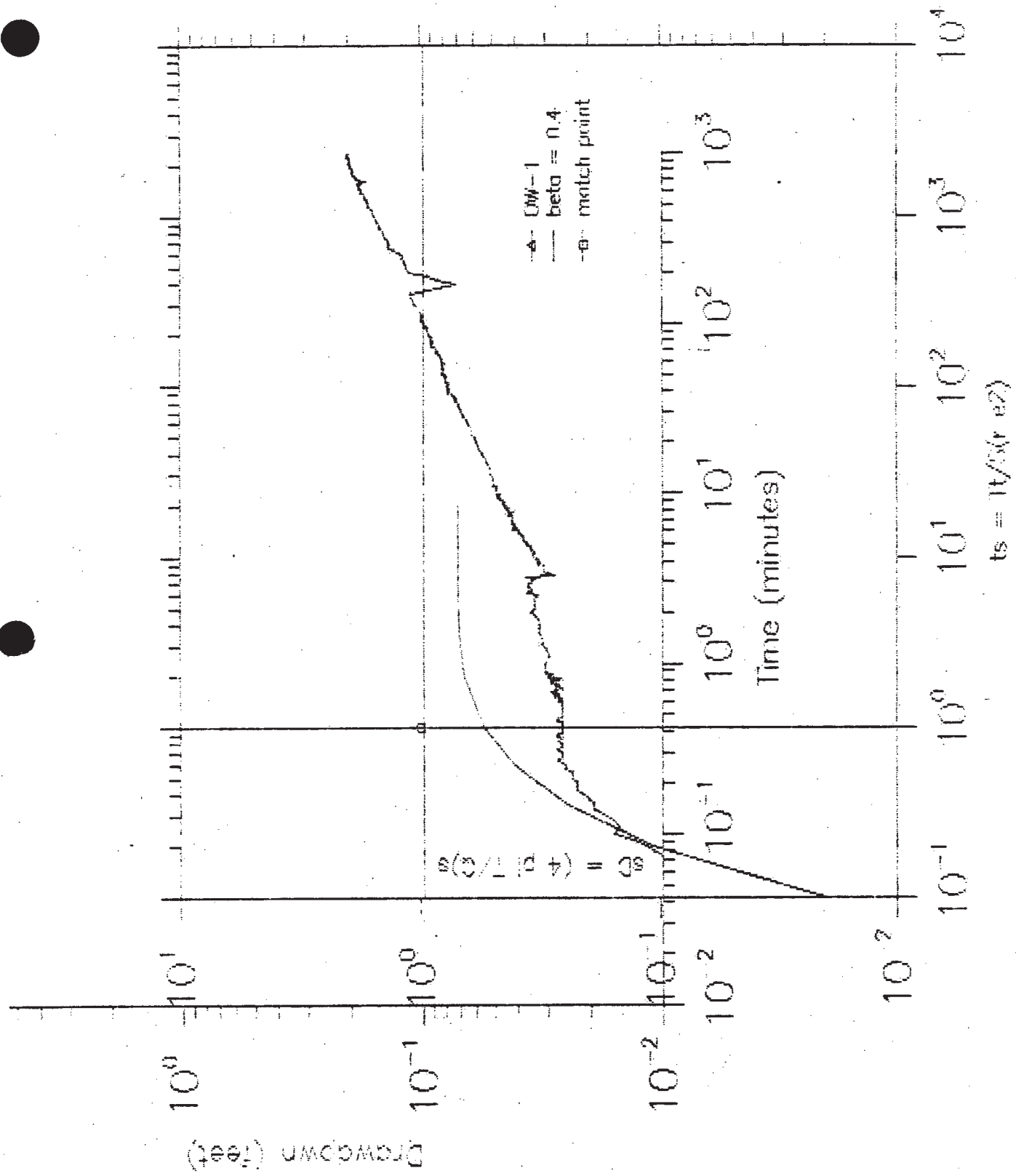
S_y = specific yield
c₂ = 0.1337 (constant)
T = 22,920 gpd/ft
t = 0.0017 days (match point)
r² = 2284.8 ft²
t_y = 0.01 dimensionless (match point)

$$S_y = 0.1337 (22,920 \times 0.0017 / 2284.8 \times 0.01)$$

$$S_y = 0.23$$



GW-7 PUMPING TEST 20 GPM



GW-7 PUMPING TEST 20 GPM

$$t_s = 10^0 / 5 \times 10^2$$

GW-9/OW-2 Long-Term Pumping Test

Transmissivity Calculation:

$$T = [c_1 (Qs_d/s)]/7.48$$

where

T = transmissivity (ft²/day)
c₁ = 114.6 (constant)
Q = 58 (gallons per minute)
s_d = 0.1 dimensionless (match point)
s = 0.018 ft (match point)

$$T = [114.6 (58 \times 0.1 / 0.018)]/7.48 \text{ ft}^2/\text{day}$$

$$T = 4,937 \text{ ft}^2/\text{day}$$

Hydraulic Conductivity (K) Calculation:

Assuming a saturated thickness (b) of 10 feet:

$$K = T/b \text{ ft/day}$$

$$K = 494 \text{ ft/day}$$

Specific Yield Calculation:

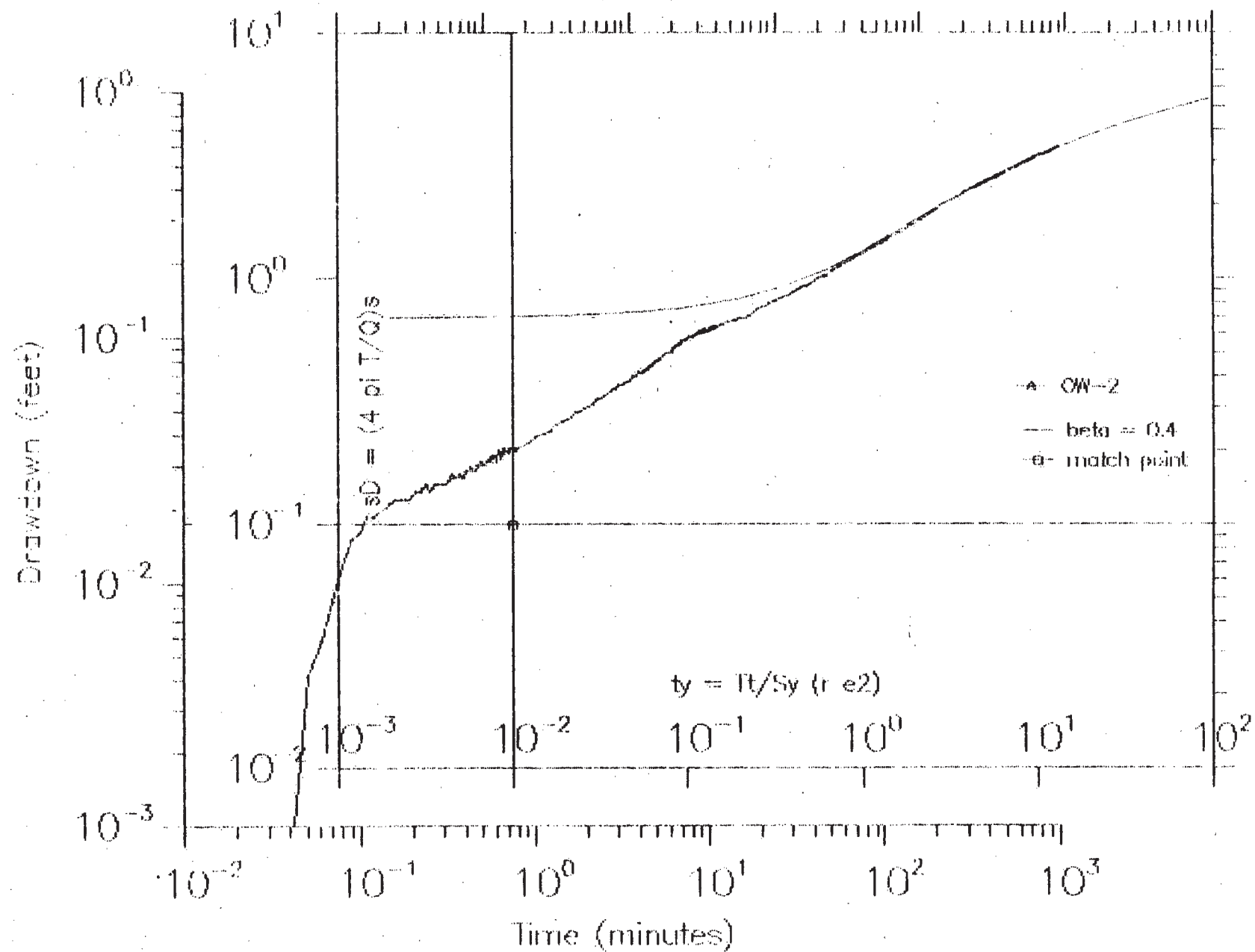
$$S_y = c_2 (Tt/r^2t_y)$$

where

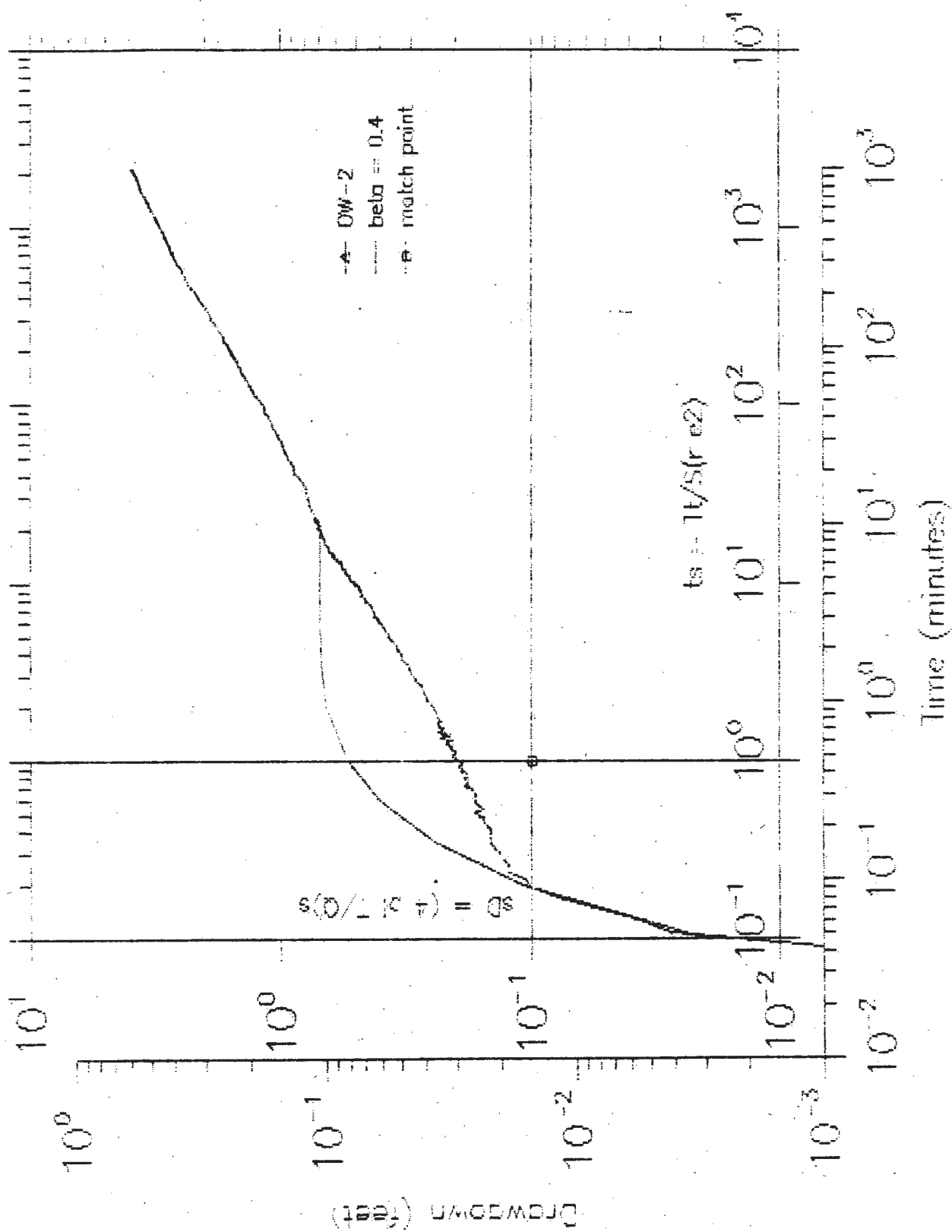
S_y = specific yield
c₂ = 0.1337 (constant)
T = 36,930 gpd/ft
t = 0.0005 days (match point)
r² = 2043 ft²
t_y = 0.01 dimensionless (match point)

$$S_y = 0.1337 (36,930 \times 0.0005 / 2043 \times 0.01)$$

$$S_y = 0.12$$



GW-9 PUMPING TEST 58 GPM



GW-9 PUMPING TEST 58 GPM

GW-19A/OW-3 Long-Term Pumping Test

Transmissivity Calculation:

$$T = [c_1 (Qs_d/s)]/7.48$$

where

T = transmissivity (ft²/day)
c₁ = 114.6 (constant)
Q = 6 (gallons per minute)
s_d = 1 dimensionless (match point)
s = 0.061 ft (match point)

$$T = [114.6 (6 \times 1 / 0.061)]/7.48$$

$$T = 1,507 \text{ ft}^2/\text{day}$$

Hydraulic Conductivity (K) Calculation:

Assuming a saturated thickness (b) of 50 feet:

$$K = T/b \text{ ft/day}$$

$$K = 30.1 \text{ ft/day}$$

Specific Yield Calculation:

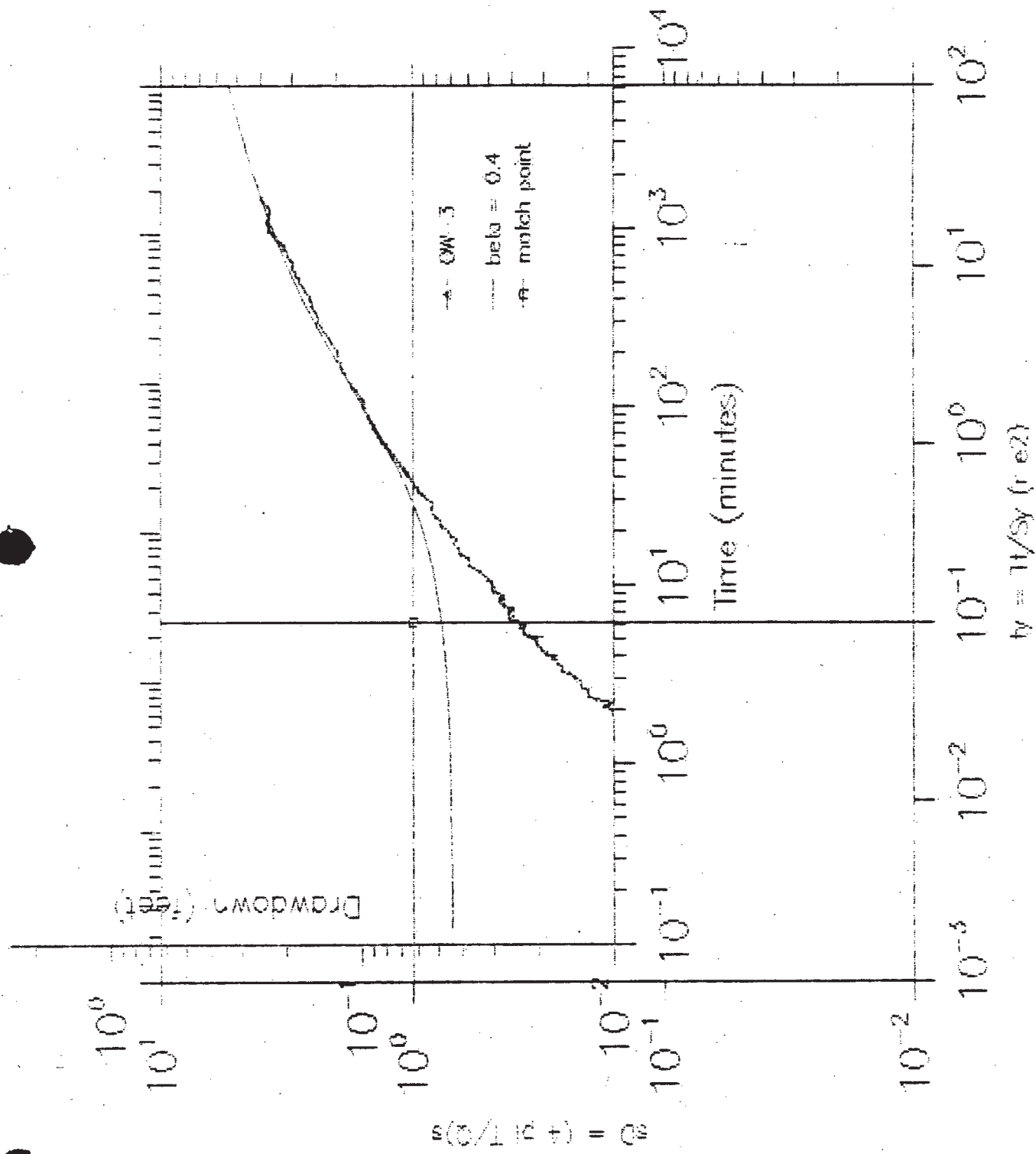
$$S_y = c_2 (Tt/r^2t_y)$$

where

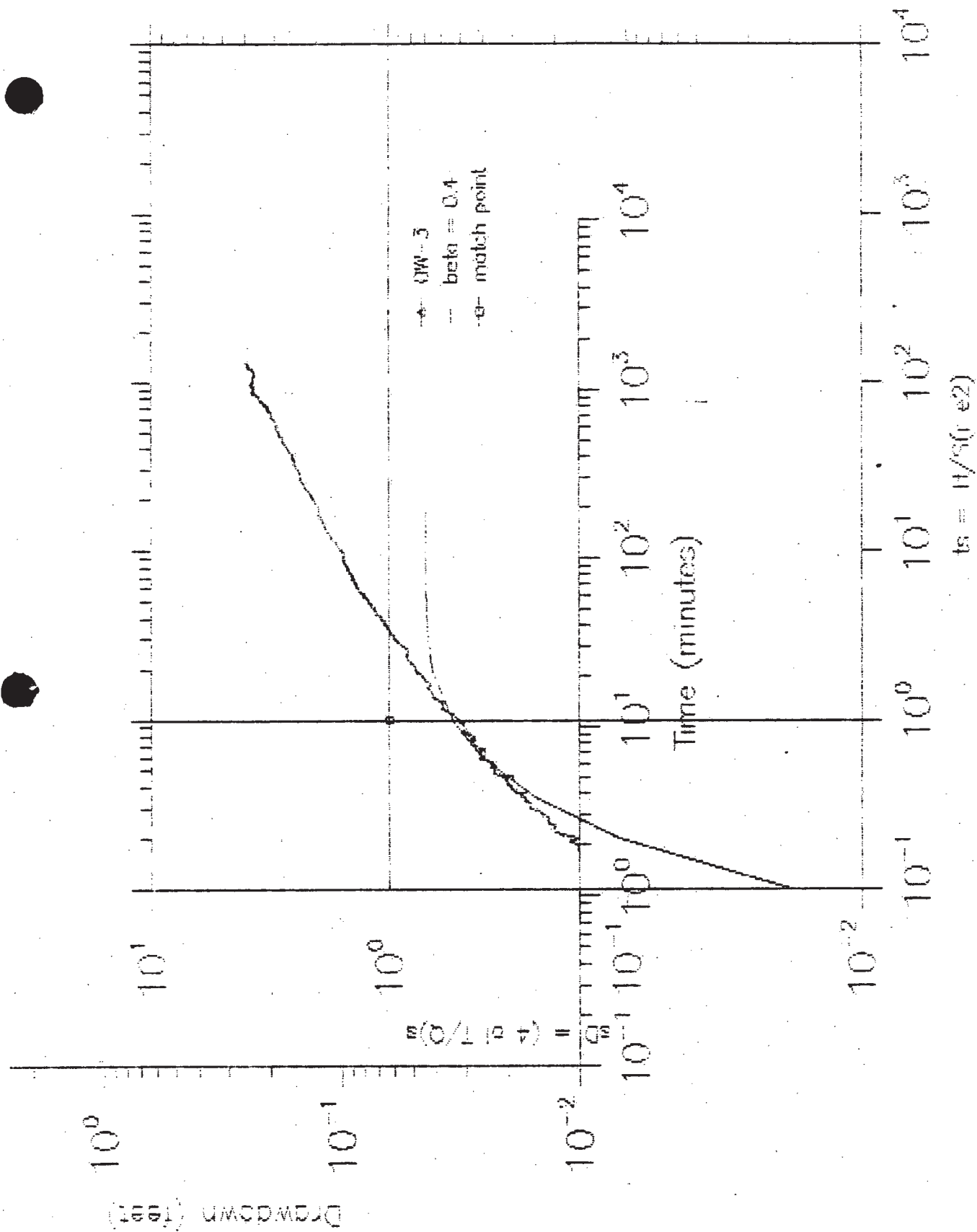
S_y = specific yield
c₂ = 0.1337 (constant)
T = 11,270 gpd/ft
t = 0.0042 days (match point)
r² = 1069 ft²
t_y = 0.1 dimensionless (match point)

$$S_y = 0.1337 (11,270 \times 0.0042 / 1069 \times 0.1)$$

$$S_y = 0.06$$



GW-19A PUMPING TEST 6 GPM



CW-19A PUMPING TEST 6 GPM

GW-33/OW-4 Long-Term Pumping Test

Transmissivity Calculation:

$$T = [c_1 (Qs_d/s)]/7.48$$

where

T = transmissivity (ft²/day)
c₁ = 114.6 (constant)
Q = 2.4 (gallons per minute)
s_d = 0.1 dimensionless (match point)
s = 0.01 ft (match point)

$$T = [114.6 (2.4 \times 0.1 / 0.01)]/7.48$$

$$T = 368 \text{ ft}^2/\text{day}$$

Hydraulic Conductivity (K) Calculation:

Assuming a saturated thickness (b) of 40 feet:

$$K = T/b \text{ ft/day}$$

$$K = 9.2 \text{ ft/day}$$

Specific Yield Calculation:

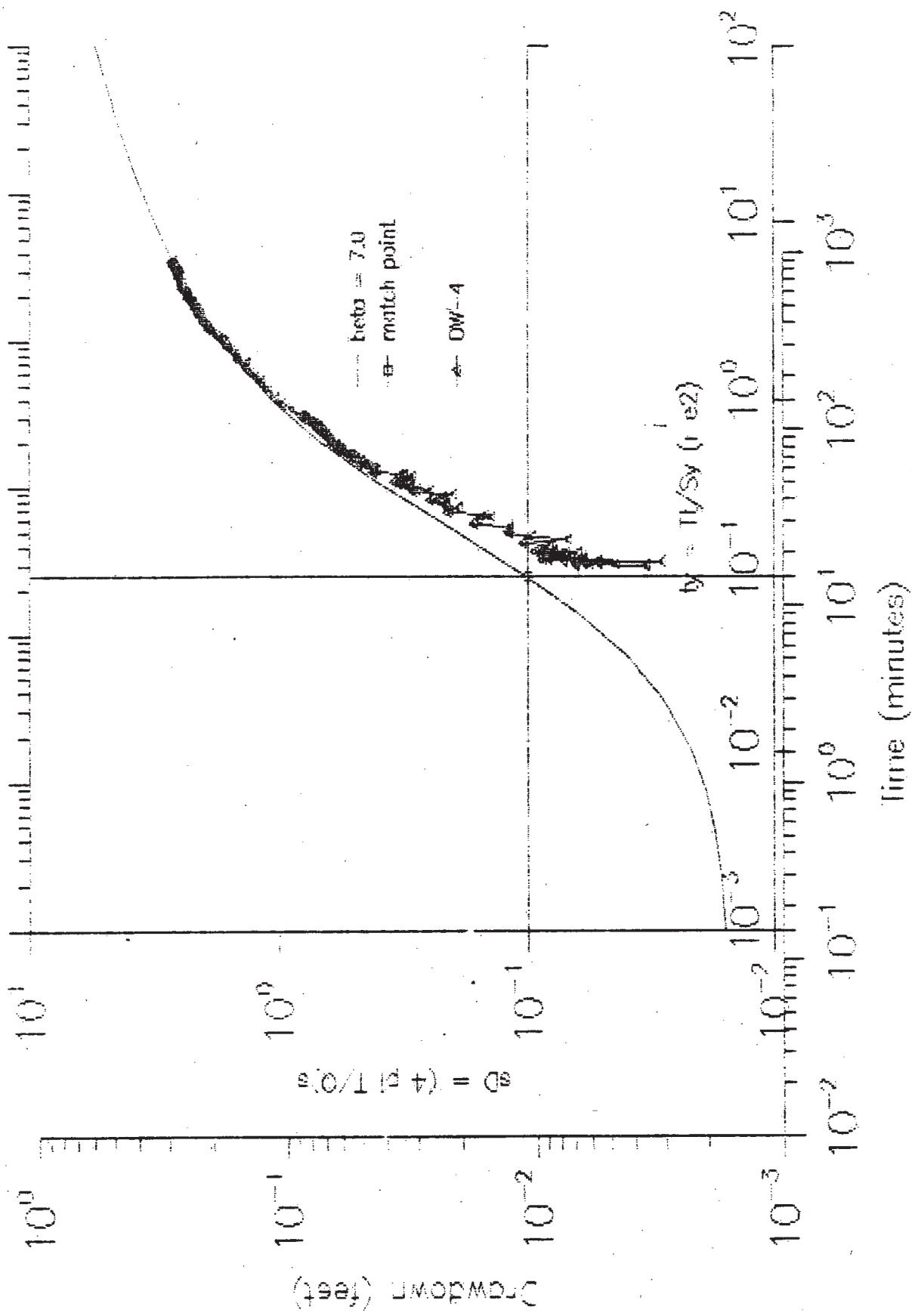
$$S_y = c_2 (Tt/r^2t_y)$$

where

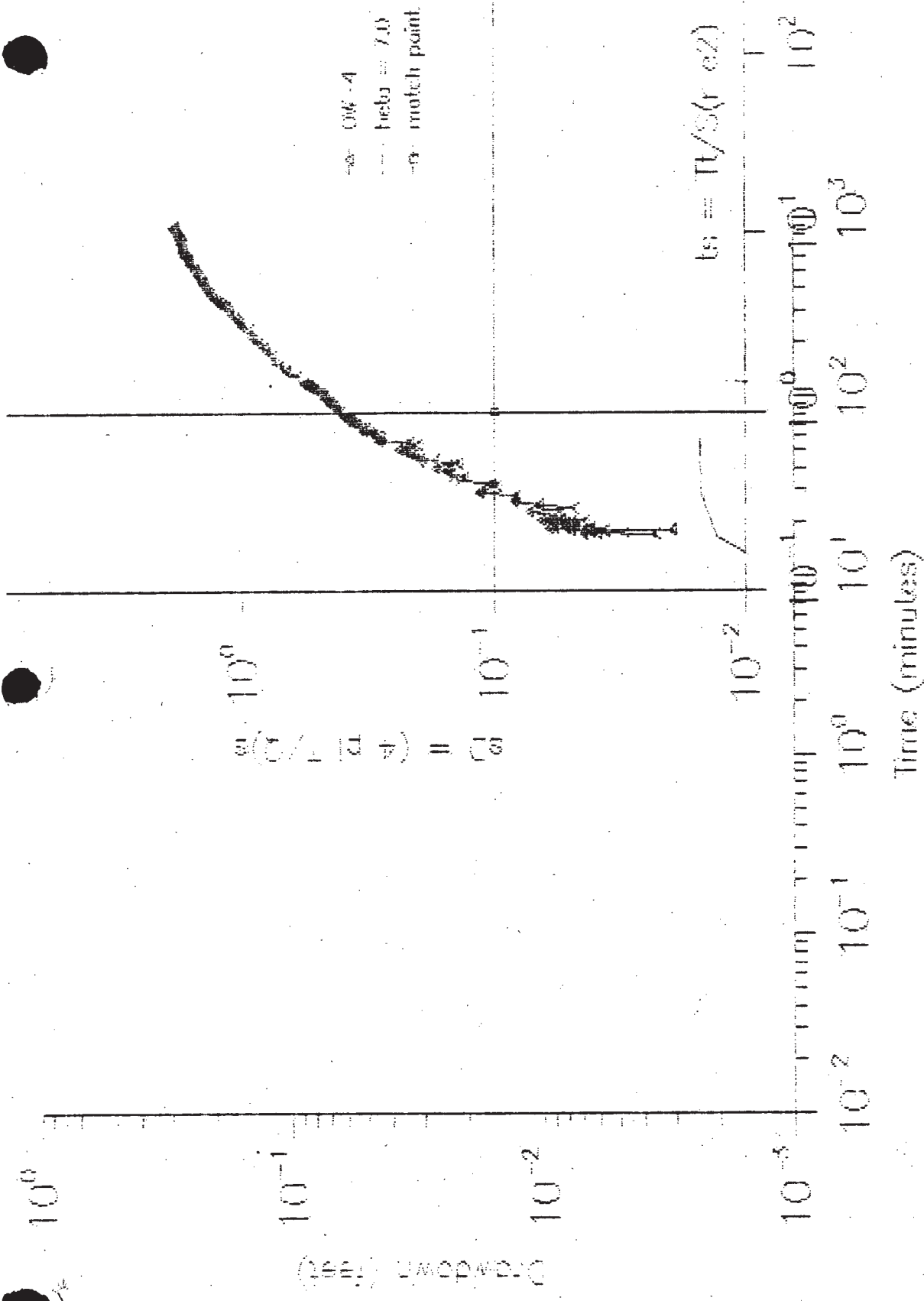
S_y = specific yield
c₂ = 0.1337 (constant)
T = 2,750 gpd/ft
t = 0.0097 days (match point)
r² = 1296 ft²
t_y = 0.1 dimensionless (match point)

$$S_y = 0.1337 (2,750 \times 0.0097 / 1296 \times 0.1)$$

$$S_y = 0.03$$



GW-33 PUMPING TEST 2.4 GPM



GW-33 PUMPING TEST 2.4 GPM